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Compliance Test Report for Furnace # 1 and Furnace # 2 at the Arecibo Facility

Prepared for: The Battery Recycling Company Inc. Arecibo, Puerto Rico

Prepared by: URS Corporation Oak Ridge, Tennessee



September 2012

COMPLIANCE TEST REPORT FOR FURNACE #1 AND FURNACE # 2 AT THE ARECIBO FACILITY

Prepared For:

The Battery Recycling Company Inc.
Arecibo, Puerto Rico

Prepared By:

URS Corporation 1093 Commerce Park Drive, Suite 100 Oak Ridge, Tennessee 37830

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For: BATTERY RECYCLING COMPANY, INC.

CERTIFICATION SHEET

Having reviewed the test program described in this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

Michael Mowery Source Testing Manager	
PROFESSIONAL EN Having reviewed this report, I herby certify the cont	NGINEERING CERTIFICATION ents of this report to be accurate and complete.
PE	
PE Certification Date: State of Certification:	_

URS Corporation

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List of Acronyms_

BRC Battery Recycling Company
CFR Code of Federal Regulations

CO₂ Carbon Dioxide

dscfm Dry Standard Cubic Feet per Minute

EQB Puerto Rico Environmental Quality Board

USEPA U.S. Environmental Protection Agency

MACT Maximum Achievable Control Technology

NESHAPS National Emission Standards for Hazardous Air Pollutants

O₂ Oxygen

QA Quality Assurance

QC Quality Control

scf standard cubic foot

scm standard cubic meter

URS URS Corporation

1.0 Introduction

The Battery Recycling Company, Inc. (BRC) owns and operates a lead recycling facility in Arecibo, Puerto Rico. BRC's operations are subject to the compliance requirements established in 40 CFR Part 63, Subpart X (National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting, "Secondary Lead Smelting MACT Standard"), the Subpart L, Standards of Performance for Secondary Lead Smelters and a construction permit issued by the Puerto Rico EQB. URS Corporation (URS) was contracted by BRC to conduct compliance particulate matter (PM) and Lead testing on their two rotary furnaces, and face velocity measurements on the Lead and Slag Taps/Molds. The compliance testing was conducted during the week of July 30, 2012. The testing was observed by USEPA, PREQB, and EPA CEPD repersenatives. The observation team consisted of Francisco Claudio- EPA CEPD, Kai Tang – EPA Region 2 New Jersey, Richard Kan – EPA Region 2 New York, and Weldin Ortiz – PREQB.

The compliance testing allowed BRC to achieve four compliance objectives. The first two objectives were to determine if the facility is in compliance with the 0.022 grains/dry standard cubic foot (gr/dscf) PM requirement, and the <20% opacity requirement, as set forth in the NESHAPS Standard Requirement 40 CFR 60.122(a). The third objective was to verify that the face velocity of the emission control hoods on the lead taps/molds and slag tap/molds were >300 feet per minute (fpm), as required in the MACT Standard 40 CFR 63.544. The fourth objective was to measure the Inorganic Lead emissions from the facility to confirm compliance with the inorganic lead emission limit of .00087 grains of inorganic lead per dry standard cubic foot for both furnaces at the facility. This test report presents the results of these test objectives along with the test data and description of the procedures used to collect the data.

Section 2.0 describes the methods and techniques that were used to conduct the compliance testing. Section 3.0 is a discussion of the compliance test results for the stack. Section 4.0 discusses the quality assurance (QA) and quality control (QC) procedures that were followed in the performance of the testing. Appendix A contains the compliance test calculation data for the

stack. Appendix B contains the field data sheets. Appendix C contains the process data.

Appendix D contains field equipment calibration data used in the compliance test. Appendix E contains the laboratory results.

2.0 Test Conditions and Technical Approach

The following sections describe the methods and techniques that were used to complete the compliance testing on Furnace # 1 and Furnace # 2.

2.1 Test Conditions and Schedule

During the week of July 30, 2012 URS performed; three 120 minute test runs for particulate matter and inorganic lead on the inlet ducts to the Furnace # 1 and Furnace # 2 baghouses and three 60 minute tests to determine Opacity on the main baghouse stack. Face velocity measurements were taken within the plane of the furnace hoods and to each kettle. The testing was performed during periods of charging and tapping only, which was determined by USEPA to be the worst case scenario that would be the most challenging for the control devices. As required by EPA, each test run was broken into segments based on charging and tapping activities. A segment of the test run would start at the beginning of an activity and the test would be stopped at the next available traverse point after the conclusion of an activity or for a predetermined time as set by USEPA. This sequence of sampling was repeated until all the test points were completed, this was designated as a single test run.

2.2 Sample Locations

The two sampling locations for the PM and lead sampling were the two baghouse inlet ducts. Both inlet ducts were 58.0 inches in diameter. Samples and velocity measurements were collected by accessing two test ports at each location. The ports were located approximately 10 ft (2.06 diameters) downstream and 10 ft (2.06 diameters) upstream of the nearest duct transition or flow disturbance. Flow measurements were performed using a 24-point traverse using two ports (12 points per port). A pretest Cyclonic flow check was performed prior to the Method 5/12 sampling and did not show any significant cyclonic flow at any traverse point across either duct. The average cyclonic flow on Furnace # 1 was 3.23 degrees and 4.58 degrees on Furnace # 2. Appendix B contains the reference method field data sheets for the stack sampling location.

2.3 Technical Approach

The methodologies that were utilized for data collection are presented and summarized in Table 2-1. The sampling procedures included in the technical approach were selected to accurately determine the properties and composition of the stack's gas stream. The selected methodologies were consistent with those recommended and referenced in Title 40 of the Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, and 40 CFR Part 63, Subpart X.

Table 2-1
Reference Method Test Procedures

Source	Pollutant	Reference Procedures for Performance Test		
	Particulate	EPA Title 40 CFR Part 60, Appendix A, Method 5, Determination of Particulate		
	Matter	Matter Emissions from Stationary Sources		
Inlet Duct for Furnace # 1 and Inorganic Furnace # 2 Lead		EPA Title 40 CFR Part 60, Appendix A, Methods 1 and 2, Determination of Stack		
		Gas Volumetric Flow Rate		
		EPA Title 40 CFR Part 60, Appendix A, Method 3A, Gas Analysis for		
		Determination of Dry Molecular Weight		
		EPA Title 40 CFR Part 60, Appendix A, Method 4, Determination of Moisture		
		Content in Stack Gases		
		EPA Title 40 CFR Part 60, Appendix A, Method 12, Determination of Inorganic		
		Lead Emissions from Stationary Sources		
Main Stack	Opacity	EPA Title 40 CFR Part 60, Appendix A, Method 9, Determination of Opacity		
Iviaiii Stack	Ораспу	Emissions from Stationary Sources		

The following are summary descriptions of the sampling methodologies that were followed to complete the sampling program.

2.3.1 EPA Methods 1 and 2, Determination of Stack Gas Volumetric Flow Rate

U.S. Environmental Protection Agency (EPA) Methods 1 and 2 were used to determine the stack gas volumetric flow rate at the sampling location. An integrated velocity traverse was conducted during each 2-hour PM test run for each of the inlet ducts at each traverse point. An S-type pitot tube and an incline manometer were used to measure the velocity pressure. A calibrated type "K" thermocouple was used to measure the stack gas temperature at each traverse point. For each test

run, the pitot tube and thermocouple were positioned sequentially at each of the appropriate traverse points. Temperature and velocity pressure (ΔP) readings were observed and recorded. Utilizing the stack gas molecular weight and moisture content, the standard (Q_{std}) and actual volumetric flow rates were calculated in accordance with the formulas found in EPA Reference Method 2. The flow rate data has been included in Appendices A and B.

2.3.2 EPA Method 3A, Determination of Stack Gas Molecular Weight

In accordance with USEPA Method 3, the stack gas O_2 and CO_2 concentrations were determined for each inlet duct. For each of the test runs, a stack gas grab sample was directly analyzed for O_2 and CO_2 content using a Fyrite analyzer. The resulting O_2 and CO_2 concentrations were used to calculate the molecular weight of the stack gas.

2.3.3 EPA Method 4, Determination of Stack Gas Moisture Content

The moisture content (%), B_{wo} , of the stack gas was determined for each inlet duct in accordance with EPA Method 4. An exhaust gas sample was drawn from the stack and passed through chilled glass impingers. The moisture content of the stack gas was determined for the compliance runs by measuring the weight gain of the chilled impingers over the length of the test run. The moisture determination was integrated into the Method 5 /12 sampling results.

2.3.4 EPA Method 5, Determination of Stack Gas Particulate Matter Emissions

The filterable particulate matter testing was performed in accordance to EPA Method 5. Sampling was performed by extracting a sample of the baghouse exhaust gas stream through a stainless steel button-hook nozzle attached to a glass-lined, heat-traced, probe. The probe was attached to a heated glass filter holder containing a pre-weighed glass-fiber filter. The probe and filter heater box were maintained at a temperature of $248^{\circ}F \pm 25^{\circ}F$. After leaving the filter holder, the gas stream sample passed through a short unheated Teflon sample line into a series of four glass impingers. The first impinger was a Smith-Greenburg filled with 100 ml of 0.1 N

Nitric Acid. The second impinger was a modified Smith-Greenburg and filled with 100 ml of 0.1 N Nitric acid. The third impinger was a modified Smith-Greenburg and was initially empty. The fourth impinger was a modified Smith-Greenburg containing approximately 200 grams of indicating silica gel. The impingers were weighed prior to assembling the sampling train to permit gravimetric moisture determination. After exiting the impingers, the exhaust gas sample traveled through an umbilical cord to the control console and was then exhausted to atmosphere. The control console contained the sample pump, dry gas meter, calibrated orifice meter, and heat controls for the probe and filter box.

At the conclusion of each test run, the sample train was recovered by washing the sample probe and nozzle three times with 0.1 N nitric acid into a sample container. The filter was removed from the filter holder and placed into a Petri dish and sealed for transport. The front half of the glass filter holder and connecting elbow were washed with 0.1 N nitric acid into the probe wash sample container. A sample of the 0.1 N nitric acid used in the sample recovery was collected and analyzed as a reagent blank. The impinger train was then disassembled and each impinger was weighed to determine the moisture gained during the sample run. After weighing the impingers, the first three impingers were emptied into a container. Each impinger and connecting glassware was rinsed with 0.1 N nitric acid and collected, this was added to the sample container for the specific sample container for each run, each separate container for each test run was then labeled. At the conclusion of sampling, all the samples were packaged and returned to the URS facility for subsequent PM analysis and shipment to the laboratory for lead analysis.

The particulate samples were analyzed by URS personnel. The analysis was performed by placing the filters into a desicator for a minimum of 24 hours. The filters were then weighed to a constant weight. The 0.1 N nitric acid probe rinses and reagent blank were transferred to preweighed cups and allowed to dry in a laboratory hood at ambient temperature. The sample cups were then transferred to a desicator and allowed to dry for a minimum of 24 hours. The cups were then weighed to a constant weight. The combined weights of the filter and probe wash were used to calculate the mass emission rate of solid particulates. After obtaining the final particulate weights, the dried residue in the cups were reconstituted with 0.1 N nitric acid and sent to the lab

along with the filters and impinger solutions for determination of the inorganic lead concentrations. The data collected during the PM sampling is contained in Appendix B.

2.3.5 EPA Method 12, Determination of Stack Gas Inorganic Lead Emissions

The inorganic lead emission rate was determined in accordance with EPA Reference Method 12 for the outlet ducts. A total of three test runs were performed. The Method 12 sampling was incorporated into the Method 5 sampling train by replacing the water in the impingers with 0.1 N nitric acid. An exhaust gas sample was isokinetically drawn from the stack through a stainless steel nozzle attached to a heated glass lined sampling probe. The exhaust gas sample was then passed through a heated glass-fiber filter and into a set of chilled glass impingers. The impingers were connected to the control console by means of an umbilical cord. The control console contained the sampling pump, sample rate controller, test temperature controls and sample rate dry gas meter. The data collected during the lead sampling is contained in Appendix B.

2.3.6 EPA Method 9 Determination of Stack Gas Opacity Emissions

VE readings from the stack exhaust were performed by a certified VE reader using the following procedures.

Observer's Position

The VE observer stood at a distance of at least one stack height away and with the sun oriented within the required 140° arc behind his back. Consistent with maintaining the above requirement, the observer made his observations from a position such that his line of vision was approximately perpendicular to the plume direction.

Field Records

The observer recorded the name of the plant, emission location, facility type, observer's name and affiliation, and the date on a field data sheet. The time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and

color of clouds), and plume background were recorded on the field data sheet at the time opacity readings were initiated and completed.

Observations

Opacity observations were made at the exit of the baghouse stack. The observer did not look continuously at the stack exit but instead observed the stack exit momentarily at 15-second intervals.

Recording Observations

Opacity observations were recorded to the nearest 5 percent at 15-second intervals on the observational record sheet. A minimum of 240 observations were recorded. Each test period took 60 minutes to complete. Each momentary observation recorded was deemed to be representative of the average opacity of emissions for a 15-second period.

Data Reduction

Opacity was determined by averaging the 240 consecutive observations recorded at 15-second intervals for each test run.

2.3.7 Determination of Hood Face Velocities using a Propeller Anemometer

The face velocities at the hood opening to the rotary furnace and at the opening to each kettle operating during the testing period were measured using a propeller anemometer. The face velocities were measured with the doors open in a manner comparable to normal operating conditions. The measurements were conducted at multiple points around the door openings. The face velocity values listed in the result table consist of the average number observed during each check of the respective source. The results are listed in Table 2-2.

Table 2-2 Face Velocity Results

Source	Face Velocity	Comments
Kettle # 1	520 ft/min	
Kettle # 2	320 ft/min	
Kettle # 3	354 ft/min	
Kettle # 4	356 ft/min	
Kettle # 5	335 ft/min	
Kettle # 6	376 ft/min	
Kettle # 7	276 ft/min	
Kettle # 8	370 ft/min	
Kettle # 9	300 ft/min	
Furnace # 1	438 / 250 ft/min	Four doors closed / two doors closed
Furnace # 2	540 / 266 ft/min	Four doors closed / two doors closed
Ingot Machine	205 ft/min	
Slag Enclosure	351 ft/min	

3.0 Performance Testing Emission Results

The following is a brief summary and discussion of the Main Baghouse stack compliance testing results.

The compliance test results for the particulate matter runs are summarized in Table 3-1 for Furnace # 1 and Table 3-2 for Furnace # 2. The average particulate matter emission rate, for the compliance test was 0.0039 grains/dscf for Furnace # 1 and 0.0052 grains/dscf for Furnace # 2. BRC's Furnace # 1 and Furnace # 2 test results indicate that the source complies with the performance standard of 0.022 grains/dscf as stated in the Subpart L, Standards of Performance for Secondary Lead Smelters. The results for the compliance tests for Visible Emissions averaged 0.0% showing compliance with the less than 20% standard in the NSPS for Lead Smelters. The results for the Inorganic Lead runs averaged 0.000016 grains/dscf for Furnace # 1 and 0.000016 for Furnace # 2 this shows compliance with the inorganic lead emission limit of .00087 grains/dscf as stated in the Secondary Lead Smelting MACT Standard.

Table 3-1 Furnace # 1 Stack Test Results

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Date	7/31/2012	8/1/2012	8/2/2012	
Run Times	14:03-20:06	12:36-20:03	11:01-19:23	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	75.685	66.270	72.768	71.574
Moisture Content (% Vol.)	4.4	4.8	4.5	4.5
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (°F)	178.8	177.9	179.3	179.0
Gas Flow Rate (DSCFM)	28,174	24,723	27,598	26,832
Percent Isokinetic	99.6	99.4	97.7	98.9
Particulate Matter Conc. (Grains/DSCF)	0.0019	0.0056	0.0041	0.0039
Particulate Matter Mass Rate (lbs/hr)	0.453	1.184	0.978	0.872
Inorganic Lead Conc. (Grains/DSCF)	0.000017	0.000022	0.000008	0.000016
Inorganic Lead Mass Rate (lbs/hr)	0.0041	0.0048	0.0020	0.0036

Table 3-2 Furnace # 2 Stack Test Results

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Date	7/31/2012	8/1/2012	8/2/2012	
Run Times	13:16-21:34	8:19-18:22	9:47-18:10	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	79.640	80.326	75.730	78.565
Moisture Content (% Vol.)	4.4	4.8	5.0	4.7
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (°F)	178.5	175.4	177.9	177.0
Gas Flow Rate (DSCFM)	34,237	34,863	34,487	34,529
Percent Isokinetic	104.3	103.3	98.5	102.1
Particulate Matter Conc. (Grains/DSCF)	0.0064	0.0043	0.0049	0.0052
Particulate Matter Mass Rate (lbs/hr)	14.720	9.934	11.283	11.979
Inorganic Lead Conc. (Grains/DSCF)	0.000018	0.000018	0.000012	0.000016
Inorganic Lead Mass Rate (lbs/hr)	0.0053	0.0053	0.0035	0.0047

4.0 Quality Assurance/Quality Control Procedure

The objective of the URS's QA Program is to ensure the accuracy and precision, as well as reliability, of the data collected and generated for URS's clients and to meet the data quality objectives of regulatory or accrediting bodies. Management, administrative, statistical, investigative, preventative, and corrective techniques were employed to maximize the reliability of data.

During the compliance testing, a strict QA/QC program was adhered to. Before actual sampling on-site, all the sampling equipment was thoroughly checked to ensure that each component was clean and operable. Any damaged or faulty equipment was tagged and removed from service until it could be repaired. If any corrective actions were taken in response to these QC checks or in response to supervisor review of QC procedures, the corrective action taken was documented in a field QA/QC logbook.

Proper equipment calibration is essential in maintaining the desired data quality level. All calibrations of the equipment used in the stack sampling portion of the testing conformed to the guidelines outlined in the EPA quality assurance handbook, *Quality Assurance Handbook for Air Pollution Measurement Systems*, *Volume III*, *Stationary Source Specific Methods* (EPA-600/4-77-027a). The following sections give a synopsis of the calibration procedures for the main components of the stack sampling systems.

4.1 Dry Gas Meters/Orifice Meters

The dry gas meter and critical orifice in each control box used during the testing were calibrated before the test in order to ensure accurate measurements of the sample gas volumes. The dry gas meter and critical orifice are normally housed as a set inside each control box and were calibrated as such. The control box was calibrated against a secondary calibration standard dry gas meter.

The dry gas meter/critical orifice sets were calibrated at predetermined nominal volume flow settings. For each of these flow rates, an accuracy ratio factor to the calibration standard (Y_i) was

computed for the individual dry gas meters. A successful calibration for a particular dry gas meter would be achieved if each value of Y_i was within 2 percent of the average value of Y_i ($Y_i = Y \pm 0.02Y$).

In order to establish calibration for the critical orifice, a calibration coefficient ($\Delta H@_I$) was calculated for each flow rate. This coefficient is the orifice pressure differential (in inches H_2O) at a distinct orifice manometer setting that gives a flow of 0.75 ft³/min of air at standard conditions. The desired tolerance for this coefficient is ± 0.2 of the average value of the four values of $\Delta H@_I(\Delta H@\pm 0.2)$. If any of the pre-test calibration coefficients for a particular meter violates the acceptance criteria, the meter in question would be adjusted and recalibrated. A copy of the control box calibrations are provided in Appendix D.

4.2 Thermocouples and Thermocouple Readouts

All thermocouples used during the stack sampling tests were calibrated to ensure accurate temperature measurements. All of the sensors utilized were type "K" thermocouples, which have a working range of approximately -300 °F to approximately 2500 °F. These sensors were used in the measurement of stack gas temperature, probe sheath temperature, filter box temperature, and impinger temperature. The thermocouples were calibrated against an NITS traceable mercury-inglass thermometer at predetermined temperatures. In order to obtain the calibration data from each sensor, a single, recently calibrated thermocouple readout was used.

The thermocouple readouts used during the testing were calibrated using a thermocouple simulator. This calibration apparatus generates a voltage signal that mimics the signal an ideal "K" type thermocouple would exhibit at a particular temperature. The signal can be changed via a slide switch. The readouts were calibrated at ten different points from 200 °F through 2000 °F, at increments of 200 °F. A copy of the thermocouple and readout calibrations are provided in Appendix D.

4.3 Barometer

The field barometer used during the test was a digital type barometer. This barometer was calibrated by comparing it to a standard mercury column barometer and adjusting it if any deviation existed between it and the standard. This exercise was performed both before and after the testing activities.

4.4 Analytical Balance

The balance used in the field to measure impinger weights was checked with calibration weights prior to use.

The analytical balance used to weigh the particulate samples was calibrated with certified weights prior to weighing the test samples.

4.5 Pitot Tubes

The S-type pitot tubes used for the isokinetic sampling were calibrated in a wind tunnel against a standard pitot, which is considered a reference source. The basis for the calibration is described in 40 CFR, Part 60, Appendix A, Method 2. A copy of the pitot calibrations are provided in Appendix D.

Appendix A

USEPA Approval Letter



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2 2890 WOODBRIDGE AVENUE EDISON, NEW JERSEY 08837-3679

JUL 2 7 2012 CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. Luis Figueroa President Battery Recycling Company, Inc. P.O. Box 1016 Arecibo, Puerto Rico 00613-1016

Re: Battery Recycling Company Stack Test Protocol

Dear Mr. Figueroa:

The United States Environmental Protection Agency (EPA) has reviewed Battery Recycling Company, Inc.'s (BRC's) stack test protocol, *Particulate, Lead and Visible Emissions Sampling Protocol* - *Furnace #1 and Furnace #2 Exhaust Ducts* (Protocol), Revision 4, dated July 24, 2012. The Protocol is conditionally approved for use in BRC's stack test that is scheduled for July 31 to August 2, 2012. EPA's approval of the Protocol is subject to the following conditions:

- 1. The revised protocol still erroneously cites testing on, of, or at the combined baghouse stack (see pages 5, 6, and 10 for instance). All emissions sampling for particulate matter and lead compounds shall be at the alternate sampling location, as indicated in the Protocol, on the respective baghouse exhaust ducts.
- 2. BRC shall maintain its routine daily operations conducted at each baghouse whereby a cleaning cycle is manually activated at each cell to verify that the system is working properly. BRC states in its document, *Answer to EPA regarding test protocol.pdf*, which was submitted to the EPA on July 17, 2012, that:
 - "As part of the routine daily operations BRC take[s] readings of the differential pressure values on each of the baghouse cell compartments. Every morning an employee will record the differential pressure values on each cell in both baghouses for a total of 16 readings. In addition a cleaning cycle is manually activated at each cell to verify [that] the system is working properly."
- 3. BRC shall also include in the Source Test Report documentation of all baghouse cell cleaning operations, manually activated or otherwise, during the week of the stack test.

- 4. One test run shall be conducted per batch process. The minimum sampling time for emissions sampling at the respective exhaust duct shall be 120 minutes for each run. The sampling regimen shall be as follows:
 - a. BRC shall conduct emissions sampling predominately during periods of furnace charging or tapping operations.
 - b. The duration of emissions sampling at each of 24 traverse points shall be five minutes.
 - c. Emissions sampling shall be conducted throughout all three phases of charging operations per batch process. If a charging operation ends prior to the end of emissions sampling at a particular traverse point, the emissions sampling at that traverse point may continue until the end of its five-minute period.
 - d. If the tapping operation for that batch process ends prior to the end of emissions sampling at a particular traverse point, the emissions sampling at that traverse point may continue until the end of its five-minute period. Emissions sampling may continue, if necessary, for the few remaining traverse points after the end of the tapping operation such that all traverse points are sampled.
- 5. BRC shall conduct visible emission observations only during periods of furnace charging or tapping operations.
- 6. BRC shall provide EPA a time schedule of all production activities and stack testing activities at least one day in advance of each day of stack testing.

If you have any questions concerning this letter, please call Héctor Vélez or Francisco Claudio of EPA's Caribbean Environmental Protection Division at 787-977-5850 or 787-977-5841, respectively. Any specific questions concerning stack testing should be addressed to Kai Tang of my staff at 732-321-4364.

Sincerely,

John \$1 Kushwara, Chief

Monitoring and Assessment Branch

Ing. Luis Sierra Torres, Director
Air Quality Area
Puerto Rico Environmental Quality Board
P.O. Box 11488
Santurce, PR 00910

Furnace # 1

TBRC Sampling Period

Furnace 1

Run #1

Date 7/31/2012

From	То	Time (min)	Stage	Charge ID
14:03	14:28	25	2 nd Charge	F1/Jul/2012/#88
15:43	16:18	35	3 rd Charge	F1/Jul/2012/#88
19:06	20:06	60	Тар	F1/Jul/2012/#88
Total Sampling Time		120		

Run #2

Date 8/1/2012

From	То	Time (min)	Stage	Charge ID
12:36	13:36	60	1 st Charge	F1/Aug/2012/#2
14:55	15:25	30	2 nd Charge	F1/Aug/2012/#2
19:33	20:03	30	Тар	F1/Aug/2012/#2
Total Sampling Time		120		

Run #3

Date 8/2/2012

From	То	Time (min)	Stage	Charge ID
11:01	11:31	30	3 rd Charge	F1/Aug/2012/#4
14:58	15:28	30	Тар	F1/Aug/2012/#4
18:23	19:23	60	2 nd Charge	F1/Aug/2012/#5
Total Sampling Time		120		

Carga de Óxido en Horno No.1

Carga	Turno	Supervisor	Fecha
11/	2-10	I. 5.45	30-14-15
06	010		/ / /

Datos de Carga Anterior						
Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección	Requerida (√)		
Charola	18"	8h15 20 Hin	() Si	(-)-No		

Material para Carga						
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)				
Óxido	32,000	33,061				
Plomo	8,000	8,038				
Polvo de Filtro	2	3				
Hierro	3,000	4000 + 4000 + 500 X				
Carbón	2,900	21874				
Soda	3,300+470	3,300+470				
Mezcia Pesada por:	J. Basado	Num.Loader:				

Flujo de Aceite					
Flama baja SP.	150 ± 10				
Valor Real	150				
Flama Media SP.	220 ± 10				
Valor Real	220				
Flama Alta SP.	260 ± 10				
Valor Real	256				

Ja 214/100/00000000000000000000000000000000		Tiempo	Tiempo Pr	ogramado	Tiempo	Real	T
Acción	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1 ^{er} Cargamento	Baja	20 min.	6:50	7:10	6:50	7:30	□A □B øĆ □D
Fundir	Media	1 Hr.	7:10	8:10	7:30	8:30	□A □B øĆ □D
2 ^{do} Cargamento	Baja	20 min.	8:10	8:30	8:50	9:30	OA OB DE OD
Fundir	Media	1 Hr.	8:30	9:30	9:30	10:30	oA ∞B oC oD
3 ^{er} Cargamento	Baja	20 min.	9:30	9.57)	10:30	11150	OA ØB OC OD
Fundir	Alta	2.15 Hr.	9:50	12:05		130 2150	DA MB DC DD
Descarga	Baja	45 min.	12:05	12:50	2:50	3:40	DA OB OC OD
Tie	mpo Total			O Hr.	8	hrs 50,	er in

011	AMERICAN III	Pulg	adas	Conos de Escoria	Charola	Cono
Olla	a #1	Iniciales	Finales			
Carga #	l l			Cantidad		We In
Carga #	#86	55 susta	37" SUSA			
Carga #	W	W.	w	Conos de Plomo	Olla p2 p3	□4 □5 □ n/a
Carga #	A In	A for		Pulgadas de Plomo Olla #1	1812	

Cal	racterísticas d	el Producto (√)
Escoria en el Horno	() No	() Si, cantida	d = 6"
Escoria	() Liquida	() Espesa	() Gruesa
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	(Y Normal
Ladrillos	() Limpio	(N) Sucio	

Limpieza del Horno (√)					
Cajón de Plomo	(L) Limpio () Sucio				
Canal	(W) Limpio () Sucio				
Boca del Horno	(V) Limpio () Sucio				
Realizado por:	O. Ospla				

Fecha Hora Loader Peso Diferencia en Realizado. Am G21 D Si No	Firmat
	П 6-2
30-ful-13 2:45 = 3.590 = 70 5-hose Rango de Tolerancia de los loaders (621D y 52)	

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	oA oB ∞C oD	2-10 =	Israel Solo	Bif /	30-141-12
Supervisor	□A □B □C □D	10-6 7	is Marrero	Jan-	30-11-12
Supervisor	DA OB DC DD	~/	8/	w/	W
Supervisor	OA OB OC OD	18th	1/4	/ FA	15 for

Supervisor de Producción:	X	. District	Fecha:	31 Jul 12	
Supervisión de Calidad:			Fecha:	10 1	

* No se añade el restante de Hiero for

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
#87	10-6	Juis Mariero	31-14-12

Datos de Carga Anterior							
Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección F	Reguerida (√)			
Charola	18 ⁿ	8 415 50 min	(V Si	() No			

TOTAL PROPERTY BANKS	Material para Care	ja .		
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)		
Óxìdo	30,000 30,094			
Plomo	8,000	8,016		
Polvo de Filtro	7	2		
Hierro	3,200	1,600+1,00	0+569	
Carbón	3,000	3,011		
Soda	3,300	3,300		
Mezcla Pesada por:	O. Oslala	Num.Loader:	621-E	

Flujo de A	ceite
Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	223
Flama Alta SP.	260 ± 10
Valor Real	257

		Tiempo	Tiempo F	rogramado	Tiemp	o Real	_
Acción	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1 ^{er} Cargamento	Baja	20 min.	3:40	4:00	3:40	4:00	oA dB oC oE
Fundir	Media	1 Hr.	4:00	5:00	4:00	5100	□A ØB □C □E
2 ^{do} Cargamento	Baja	20 min.	5!00	5:20	5:00	5:20	DA ØB DC DE
Fundir	Media	1 Hr.	5:20	6:20	5:20	622	OA OB OC OD
3 ^{er} Cargamento	Baja	20 min.	6:20	6:40	6.20	6.50	OA OB OC OL
Fundir	Alta	2.15 Hr.	6:40	8:55	6:50	11:10	DA DB DC DE
Descarga	Baja	45 min.	8:55	9:40	11:10	12.00	DA DB DC DE
Tier	npo Total			00 Hr.8 h 2	Skala +		

		Pulg	adas	Conos de Escoria	Charola	Cono
Olla	#1	Iniciales	Finales			
Carga #	K	77~	20"	Cantidad		7
Carga #						
Carga #		-A		Conos de Piomo	Olla □2 □3	04 05 on/a
Carga #				Pulgadas de Plomo Olla #1	17	

Cai	racterísticas d	el Producto (√)	Francisco (p. 1994)	//SESSON
Escoria en el Horno	() No	() Si, cantida	d= 7	Limpieza Cajón de Plomo	dei (-
Escoria	()-Liquida	() Espesa	() Gruesa	Canal	(-
				Boca del Horno	(
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	(-) Normal	Realizado por:	ede
Ladrillos	(-) Limpio	() Sucio			

Limpieza	del Horno (√)
Cajón de Plomo	(-) Limpio () Sucio
Canal	() Limpio () Sucio
Boca del Horno	() Limpio () Sucio
Realizado por:	eduin san tana

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
31-ful-12	☐ Am ☐ Pm	□621 D □521 D □621 E	3,659	☑SI □ No = -12	O. Ogolo	Am	□ 6-2 □ 2-10 □ 10-6	82

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	DA ØB DC DD	10-6	Luis Marrero	The	31-12-12
Supervisor	oA oB oC ⊕Đ	10-2	Juan GREKOR	Orden G	7.71.12
Supervisor	nA oB oC oD			7) 7	
Supervisor	□A □B □C □D			Ā	

Supervisor de Producción:	· H Some	Fecha:	2)090/12	
Supervisión de Calidad:		Fecha:		-

A Flujo de aceite Manual Pendiente

No. Ca	rga		Carga de	Supe	ervisor		Fecha	
788	77.NO.4275	6.0	2	Juano	perez	7	71.12	
Andreas and the	NAME OF STREET			- do Coron	Antorior	TELEVISION AND AND AND AND AND AND AND AND AND AN	50.69\$155548.75	1/4/11/19/6/5
Escol		Plome	(Pulg.)	s de Carga	de Corrida	Corre	ección Requ	uerida (√)
	_	17 4		8 hraam		()		(-) NO
tham L	a	1.7		o maan	ит			
			al para Car	ja			Flujo de	Aceite
Materia	iles	Peso Pa	atrón(Lbs.)		edido (Lbs.)	Flar	na baja SP.	150 ± 10
Öxido				-72ps		_ V	alor Real	1.50
Plomo	01000			8,02	ч	Flam	na Media SP.	220 ± 10
Polvo de F		2.		<u>a.</u>	7. a lu	- I	222	
Hierro		7.200			+1,000th	00 Fla	ma Alta SP.	260 ± 10
Carbór		17,000		3,041		_	alor Real	261
Soda		7,300		J.Joa Num.Loa	der: / 214	_	aloi Kedi	0.01
lezcla Pesa	а рог:	Julmes	d'hark	Палисоа	der: 621	-		
9 A A	8 100		Acomp	añamiento	de la Carg	a		
			Tiempo	Tiempo F	rogramado	Tiemp	o Real	Turno
Acciór	1	Flama	Patrón	Inicial	Final	Inicial	Final	
1 ^{er} Cargam	ento	Baja	20 min.	12-50	12.20	12:00	12:70	□A □B □C □
Fundir		Media	1 Hr.	12.20	1:20	12:30	1:70	OA OB OC
2 ^{do} Cargan	ento	Baja	20 min.	1:20	1:40	1230	2:42	eA GB GC G
Fundir		Media	1 Hr.	140	2.40	2:40	3:40	BA OB oC o
3 ^{er} Cargam	ento	Baja	20 min.	2:40	7:00	3:40	4:40	eA oB oC o
Fundir		Alta	2.15 Hr.	J.500	2.12	4:40	7:00	⊕A □B □C □
Descar		Baja	45 min.	5:15	6:00	1.00		OA OB OC O
	Tie	mpo Total		6.1	00 Hr.		Ohrs	
CONTRACTOR OF THE PARTY OF THE	KASTHONIAN	an manager at	Para la Caración de l	Conc	s de Escoria	Ch	arola	Cono
Olla	#1	Iniciale	Igadas Finales		3 40 1300114			
Carga #	4 88	20.1	3/5000		Cantidad			11/1
Carga #	28	124	7,50 74	-				
Carga #		1		Con	os de Plomo		011a =2 =3 =	4 □5 □ n/a
Carga #				Pulgadas	de Plomo Olla	#1 /7		
		rísticas de	l Producto		DENSAME	Limpieza	del Horn	o (V)
scoria en e	()	No	() Si, cantio	iad = ' 7	Cajór	de Plomo		pio () Sucio
Horno	17			7		Canal		npio () Sucio
Escoria	(/)	Liquida	() Espesa	() Grues	00	del Horno	(TLin	
Color del	()	Negra	() Blanca	() Norma	.	izado por:	NaTal	, , , , ,
Humo		ilta Hierro	Falta Carbón (Sucio			Lude por	10 01/01/	
Ladrillos	٠	Limpio						
15年10日	antonia de	Responsa	abilidad de Ope	rador	1000	Resp Verific		le Supervisor
Fecha		Hora Verific	ler Peso ado Medido	Diferencia en Peso	Realizado Firm			no. No Carg
4.00		Sales and State	CHARLES AND CONTRACTOR	□ Si 🗀 No		Firma): [2] 6-1	2
		☐ Am	D 1		Juanes Bin	0.00	<u> </u>	10 1000
			E 3.679	=+19	35 01 71	Julin Julin	10	-6
7-31-1	2	8:4a		and the second second	COMPANY	50010 27/4015	200000000000000000000000000000000000000	Sunsbegrowssagen
WINTER STATE		Rango	de Tolerancia o	ie los loagers	621U Y 5210'S	0000 8 074010		
Supervisore	s	Turno	Hora	Nombr	e	Firm	a	Fecha
Supervisore								
Supervisore		A oB oC eĐ	6.2 5	uan GP	1×02 1	maria.	G	7-31-12

2 000 12

Δ

Fecha:

Fecha:

OA OB OC OD

DA DB DC D

Supervisor

Supervisor

Supervisor de Producción: Supervisión de Calidad:

No. Carga		Turno	Sup	ervisor		Fech	
+189	+189 2-10		Edison (Penzalez		7/31/	112
		Date	s de Carga	Anterior			
Escoria		o (Pulg.)	Tiempo	de Corrida	(orrección Reg	uerida (√)
harola		17	8	hrs		(9 Si	() No
ASSISTANTIAN TOTAL STOR	Mater	ial para Car	ga		46 50	Flujo de	Aceite
Materiales		atrón(Lbs.)		ledido (Lbs.)		Flama baja SP.	150 ± 10
Óxido	32,000		3208	2081		Valor Real	
Plomo	8,000		8.029	8.029			15 j 220 ± 10
Polvo de Filtro	1		2			Flama Media SP.	
Hierro	3,000		1,000150	06+5007	500 -	Valor Real	241
Carbón	2,900		2,936			Flama Alta SP.	260 ± 10
Soda	3,300		3,300)		Valor Real	261
lezcia Pesada por:	Jugn	7 (0.1)	Num.Loa	der: 621			
THE RESERVED OF THE PARTY.		Acomp	añamiento				
		Tiempo	-	rogramado		empo Real	Turno
Acción	Flama			Final	Inicia	al Final	
Acción	Flama	Patrón	Inicial				
1 ^{er} Cargamento	Baja	20 min.	8:00	8:20	8:00	9:00	
1 ^{er} Cargamento Fundir	Baja Media	20 min.	8:00 8:20	8:20	9:00	10:00	eA oB oC ol
1 ^{er} Cargamento Fundir 2 ^{do} Cargamento	Baja Media Baja	20 min. 1 Hr. 20 min.	8:00 8:20 9:20	8:20 9:20 9:40	8:00	10:00	eA oB oC of
1 ^{er} Cargamento Fundir 2 ^{do} Cargamento Fundir	Baja Media Baja Media	20 min. 1 Hr. 20 min. 1 Hr.	8:00 8:20 9:20 9:40	8:20	10:00	10:00 11:00	OA SBOCOL
1 ^{er} Cargamento Fundir 2 ^{do} Cargamento Fundir 3 ^{er} Cargamento	Baja Media Baja Media Baja	20 min. 1 Hr. 20 min. 1 Hr. 20 min.	8:00 8:20 9:20 9:40	8:20 9:20 9:40 10:40	9:00	10:00 11:00 1:00	eA OB oC ol oA eB oC ol oA eB oC ol oA eB oC ol
1 ^{er} Cargamento Fundir 2 ^{do} Cargamento Fundir	Baja Media Baja Media	20 min. 1 Hr. 20 min. 1 Hr.	8:00 8:20 9:20 9:40	8:20 9:20 9:40 10:40	10:00	10:00 11:00	eA GB oC oI eA GB oC oI oA eB oC oI

011	1#1	Pulg	adas	Conos de Escoria	Charola	Cono
Ulla	1 #1	Iniciales	Finales			
Carga #				Cantidad	1	E pr
Carga #	# 89	10 susia 17 cia	0"			
Carga #	N/	W	w/	Conos de Plomo	Olla □2 □3	_4 _5 _ n/a
Carga #	11/11/11	18-111	151	Pulgadas de Plomo Olia #1	1971	

6.00 Hr.

Tiempo Total

Ca	racterísticas d	el Producto (√)		2-16
Escoria en el Horno	() No	() Si, cantida	d = 7"	Cajón de Plomo	(V) Limpio () Sucio
Escoria	() Liquida	(5) Espesa	() Gruesa	Canal	(L) Limpio () Sucio
				Boca del Horno	(Limplo () Sucio
Color del Humo	(Negra Falta Hierro	() Blanca Falta Carbón	() Normal	Realizado por:	O. Ogola
Ladrillos	() Limpio	(Sucio			0

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
7/31/12	Am O m	□621 D □521 D □621 E	3,671	□ Si ☑ No = + //	JUGA	E.G.	☐ 6-2 ☐ 2-10 ☐ 10-6	#89

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	GA □B □C □D	2-10	Son Confeler	E.C.	7/3//12
Supervisor	□A □B □C □D	10-6 4	vis Marrero	Jon-	31-101-12
Supervisor	aA aB aC aD	N/	w/	11/	w
Supervisor	□A □B □C □D	15m	/F YN	In	1 Am

Supervisor de Producción:	Fecha:	2 cooliz	
Supervisión de Calidad:	Fecha:	1)	

ý. ₹ /igco.

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha	
#2	10-6	Juis Marreso	2-190-12	

	Dato	and the second		
Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección R	equerida (√)
Charola	1912	8hrs	(L) Si	() No

	Material para Care	ja 💮	
Materiales	Peso Patrón(Lbs.)	Peso Medido	(Lbs.)
Óxido	32,000	32,101	
Plomo	8,000	8,042	
Polvo de Filtro	2	02	
Hierro	3,000	1,300+1,2	100+501
Carbón	5,900	2,889	
Soda	3,300	3,300	
Mezcla Pesada por:	A. Buiz	Num.Loader:	621-5

Flujo de A	ceite
Flama baja SP.	150 ± 10
Valor Real	151
Flama Media SP.	220 ± 10
Valor Real	ا م کام
Flama Alta SP.	260 ± 10
Valor Real	262

		Tiempo	Tiempo Programado		Tiempo Real		
Acción	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1 ^{er} Cargamento	Baja	20 min.	4:00	4:20	4:00	5:00	□A ♂B □C □D
Fundir	Media	1 Hr.	4:20	5:20	5:00	6:00	DA SE OC DD
200 Cargamento	Baja	20 min.	5:20	5:40	6:00	7:30	oA oB oC ⊳B
Fundir	Media	1 Hr.	5:40	6:40	7:30	8:30	OA OB OC OC
3 ^{er} Cargamento	Baja	20 min.	6:40	7:00	92:30	9,20	□A □B □C □Æ
Fundir	Alta	2.15 Hr.	7:00	9:15	9:20	11:40	oA oB oC ⊕€
Descarga	Baja	45 min.	9:15	10:00	11.40	12:40	OA OB OC OB
Tie	mpo Total		6.0	00 Hr. 8 hr	10mn+		

Olla #1		Pulgadas		Conos de Escoria	Charola Cono		
Olla	3 #1	Iniciales	Finales				
Carga #	#2	0"	O 11	Cantidad		7-4	
Carga #	43	60"	48"				
Carga #	-			Conos de Plomo	Olla 02 03	o4 o5 o n/a	
Carga #	T	A		Pulgadas de Piomo Olia #1	18526 120	molla # fy. TCon	

Cai	racterísticas de	l Producto (√)		
Escoria en el Horno	() No	() - Sī, cantidad = 2 "			
Escoria	() Liquida	() Espesa	() Gruesa		
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	() Normal		
Ladrillos	() Limpio	() Sucio			

Limpieza del Horno (√)					
Cajón de Plomo	(-) Limpio () Sucio				
Canal	() Limpio () Sucio				
Boca del Horno	() Limpio () Sucio				
Realizado por:	Dowinsan tana				

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado' Visualmente Firma:	Turno	No. Carga
2-1gg-12	☐ Am ☐ Pm	□621 D □521 D □621 E	6,659	図Śi □ No = -ヱ	A-Ruiz	Am.	☐ 6-2 ☐ 2-10 ☐ 10-6	#1

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	□A @B □C □D	10-6	Luis Marvero	fm	2-190-12
Supervisor	oA oB oC ₽Đ	6.2	Juan 6 Perez	Onen C-	1.8.12
Supervisor	□A □B □C □D			NO	**
Supervisor	aA aB aC aD			A	

Supervisor de Producción:	J. Samo	Fecha:	2 aplie
Supervisión de Calidad:	Y	Fecha:	, 0,
11=1	<u> </u>		

* Presion de acelte manual Im

Battery 7

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
4つ	6-2	Juan Greis	8./-12

Datos de Carga Anterior							
Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (
Cha rala	10"	8 hr ya mont	() Si	(-)-110			

2. 化的制度相比。	Material para Caro	ja –
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	12,000	32,018
Plomo	8,000	8,014
Polvo de Filtro	2.	2.
Hierro	3,900	1,100 + 1000 +900
Carbón	2,900	2.924
Şoda	7.300	7,300
Mezcla Pesada por:	Juan Och inass	Num.Loader: 621F

Flujo de A	ceite
Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	220
Flama Alta SP.	260 ± 10
Valor Real	261

Acción		Tiempo	Tiempo Programado		Tiemp	o Real	_
	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1 ^{er} Cargamento	Baja	20 min.	12:40	1:00	12.40	172640	OA OB OC OD
Fundir	Media	1 Hr.	1:90	200	1:40	2540	DA DB OC OD
2 ^{do} Cargamento	Baja	20 min.	2,00	2120	2.40	31190	ØA OB OC OD
Fundir	Media	1 Hr.	3:20	3:20	3:40	41:40	BA OB OC OD
3er Cargamento	Baja	20 min.	3-2 A	7:40	4:40	5:30	ØA DB OC OD
Fundir	Alta	2.15 Hr.	7.40	5-50	5:30	7:40	dA □B □C □D
Descarga	Baja	45 min.	5:55	6.40	7:40	8:40	ďA □B □C □D
Tie	empo Total			0 Hr.		8his	

-			Olla #1 Pulgadas		Conos de Escoria	Charola	Сопо
Olla	1#1	Iniciales	Finales	7			
Carga #	62	48".	27	Cantidad		11/2	
Carga #							
Carga #	N	N	N	Conos de Plomo	Olla □2 □3	_4	
Carga #	14	/A	19	Pulgadas de Plomo Olla #1	17		

	racterísticas d		
Escoria en el Horno	() No	('Si, cantida	d = ' '7
Escoria	(Liquida	() Espesa	() Gruesa
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	() Normal
Ladrillos	() Limpio	(Sucio	1

Limpieza	Limpieza del Horno (√)					
Cajón de Plomo	() Limpio () Sucio					
СапаІ	(/ Limpio () Sucio					
Boca del Horno	(Limpio () Sucio					
Realizado por:	Nortal					

	Re	esponsabilid	ad de Ope	rador	The second of the second	Responsab	ilidad de Si	pervisor
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
Q ,	1 Am □ Pm	□621 D □521 D □-621 E	3,674	□ SI (⊒1√10 = +14	Juan es Binasa	Juan G	☐ 6-2 ☐ 2-10 ☐ 10-6	II 2

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	oA oB oC ₽Đ	6.2	Jum G. Perisa	Organ G	8-1-12
Supervisor	e∕A □B □C □D	2-10	Edison Goszález	086	8/1/12
Supervisor	□A □B □C □D	N	NI	N/	d
Supervisor	oA oB □C oD	1/4	1/4	/A	1

Supervisor de Producción:	Descel	Fecha:	2	ggo	٧Z	
Supervisión de Calidad:	\	Fecha:		0		

Carga de Óxido en Horno No.1 Fecha Supervisor o. Carga 8/1/12 2-10 Son Conzolez Datos de Carga Anterior Corrección Requerida (√) Tiempo de Corrida Escoria Plomo (Pulg.) (TNO () Si "17 X 115 harale Flujo de Aceite Material para Carga Peso Medido (Lbs.) Peso Patrón(Lbs.) Flama baja SP. 150 ± 10 Materiales 32079 Óxìdo 2000 Valor Real 152 Plomo 051 000 220 ± 10 Flama Media SP. Polvo de Filtro 242 Valor Real Hierro 50012001 000 Flama Alta SP. 260 ± 10 882 Carbón 900 Valor Real 700 261 Soda 300 Num.Loader: Mezcia Pesada por: TUGA Acompañamiento de la Carga Tiempo Real Tiempo Programado Tiempo Turno Flama Acción Inicial Final Final Patrón Inicial OA OB OC OD 9:40 8:40 20 min. 40 9:00 1er Cargamento Baja 9:40 10:40 B C D 10:00 Media 1 Hr. Fundir 00 OA OB OC OD 11340 Baja 20 min. 10120 10:40 2^{do} Cargamento :00 OA OB OC OD 1 Hr. 11:40 12:40 Media Fundir OA OB OC OD 20 min. 40 12:40 3er Cargamento Baja 20 OA OB OC OD 40 1:40 2.15 Hr. 1155 Alta Fundir OA OB DE OD 1:40 7100 45 min. Descarga Baja 6.00 Hr. 10 Jus. 20 Hins. Tiempo Total Cono Conos de Escoria Charola Pulgadas Olla #1 Iniciales **Finales** 1 /m Cantidad Carga # 廿3 Carga # SUSTO Susta Conos de Plomo Olla 02 03 04 05 0 n/a Carga # Pulgadas de Plomo Olla #1 Carga # Características del Producto (√) Limpieza del Horno (√) Escoria en el () No (Si, cantidad = (Limpio () Sucio Cajón de Plomo Horno) Sucio Canal (√) Limpio (Liquida (() Espesa () Gruesa Escoria Boca del Horno (Limplo () Sucio () Blanca Falta Carbón Negra Color del (Normal Realizado por: Falta Hierro Humo (Limpio () Sucio Ladrillos Responsabilidad de Supervisor Verificado Visualmente Turno No. Caro Responsabilidad de Operador Diferencia en . Loader Peso No. Carga Realizado Firma: Fecha Hora Verificado Peso Medido □ 6-2 Si TNo ☐ Am □621 D 42-10 □521 D THE M 10-6 JUga ₫621 E 3,681 121 8/1/12 Rango de Tolerancia de los loaders 621D y 521D 3580 a 3740 bs Fecha Firma Turno Nombre Supervisores 8/1/12 BA OB OC OD Supervisor 00-12 DA B OC DD 10-6 Marvero Supervisor -COD - 12 DA DB DE DD 6-2 Supervisor OA OB OC OD Supervisor

2 000 12

Fecha:

Fecha:

SIONE

Supervisor de Producción:

Supervisión de Calidad:

Carga de Óxido en Horno No.1 Fecha 10-6 Marre 10 Datos de Carga Anterior Tiempo de Corrida Corrección Requerida (√) Plomo (Pulg.) Escoria (es Si () No 174 harola 10 hr 20 mmt Flujo de Aceite Material para Carga Peso Medido (Lbs.) Peso Patrón(Lbs.) 150 ± 10 Materiales Flama baja SP. 32,000 32,087 Óxido 50 Valor Real 8,024 Plomo 220 ± 10 Flama Media SP. Polvo de Filtro Valor Real 221 5001 Hierro 3,000 Flama Alta SP. 260 ± 10 2,900 ,893 Carbón 3,300 3,300 Valor Real 260 Soda Paul Num.Loader: 621-E Mezcla Pesada por: Acompañamiento de la Carga Tiempo Real Tiempo Programado Tiempo Turno Acción Flama **Final** Inicial Final **Inicial** Patrón OA OB OC OB 20 min. 1er Cargamento Baja 7.50 7:50 OA OB OC OD Fundir Media 1 Hr. 7 .. 50 150 OA OB OC OD 9-40 20 min. 2^{do} Cargamento Baja . 50 □A □B □C 11D Media 1 Hr. Fundir OA OB OC OD 20 min. 3er Cargamento Baja 10,40 EA OB OC OD 2.15 Hr. 5:00 Fundir Alta 11.40 MA OB OC OD 3.00 45 min. 4:00 Descarga Baja 1-00 Tiempo Total 6.00 Hr. hes Conos de Escoria Charola Cono Pulgadas Olla #1 Iniciales Finales Cantidad Carga # 201 Carga # Olla p2 p3 p4 p5 p n/a Conos de Plomo Carga # Pulgadas de Plomo Olla #1 Carga # Características del Producto (√) Limpieza del Horno (√) Escoria en el (Si, cantidad = 2) No (Limpio () Sucio Cajón de Plomo Horno (Limpio () Sucio Canal () Gruesa () Liquida () Espesa Escoria) Sucio (Limpio (Boca del Horno) Blanca Color del Negra () Normal 10/01 Realizado por: Humo Falta Hierro Falta Carbón Ladrillos) Limpio (Sucio Responsabilidad de Supervisor Responsabilidad de Operador Verificado Loader Diferencia en Realizado Firma: Visualmente Turno Fecha Verificado Peso □ 6-2 ØSi □ No **☑**Am □621 D 2-10 □521 D □621 E ☐ Pm 3,700 210-6 +40 Rango de Tolerancia de los loaders 621D y 521D:3580 a 3740lbs Fecha Nombre Firma Supervisores Turno Hora 10-6 Supervisor OA BOCOD 1-2-12 OA OB OC @D Supervisor DA OB OC OD 2-10 3/1/12 Supervisor OA OB OC OD Supervisor Supervisor de Producción: Fecha: Fecha: Supervisión de Calidad:

Carga de Óxido en Horno No.1 Fecha No. Carga 8-2-1) G Penos J6 (Datos de Carga Anterior Corrección Requerida (√) Tiempo de Corrida Plomo (Pulg.) Escoria () No (-1 Si harola Flujo de Aceite Material para Carga Peso Medido (Lbs.) Peso Patrón(Lbs.) 150 ± 10 Flama baja SP. Materiales Óxido 32,042 151 32,000 Valor Real Plomo 8,017 2,000 220 ± 10 Flama Media SP. Polvo de Filtro 221 Valor Real Hierro 1,700 +500/800 000 260 ± 10 Flama Alta SP. 2,921 Carbón 2.900 Valor Real Şoda 7.100 J.700 Num.Loader: Mezcla Pesada por: Juan es Pinasa Acompañamiento de la Carga Tiempo Real Tiempo Programado Tiempo Turno Acción Flama Final Inicial **Final** Inicial Patrón 4:00 GA BB C D 5:00 1er Cargamento Baja 20 min. 400 120 MA OB OC OD 20 Media 1 Hr. :00 6:00 Fundir 120 MA OB OC OD 7:30 Baja 20 min. 120 :00 2^{do} Cargamento 8:30 A B C D 40 1 Hr. 40 7:30 Media Fundir A B oC oD 9:15 7:00 7:30 40 3er Cargamento Baja 20 min. 9:15 DA DB &C DD 9:15 11:30 2.15 Hr. Fundir Alta 7:00 DA OB DE OD 45 min. 10:09 Descarga Baja 8his 50 Min Tiempo Total 6.00 Hr. Cono Conos de Escoria Charola Pulgadas Olla #1 Iniciales | Finales NA FIR Cantidad 1559 Carga # Carga # 13" Olla 02 03 04 05 0 n/a Conos de Plomo work Carga # Pulgadas de Plomo Olla #1 +2" +1 Com exel Judo Carga # Características del Producto (√) Limpieza del Horno (√) () SI, cantidad = 6Escoria en el () No () Limpio () Sucio Cajón de Plomo Horno (/) Limpio () Sucio Canal () Gruesa () Liquida () Espesa Escoria (Limpio () Sucio Boça del Horno () Blanca Negra Color del () Normal Realizado por: Humo Falta Hierro Falta Carbón Ladrillos) Limpio () Sucio Responsabilidad de Supervisor Responsabilidad de Operador Verificado Peso Diferencia en Loader Visualmente No. Carga Realizado Firma: Fecha Hora Medido Peso Verificado **⊟**-6-2 □621 D □Si ⊡-No ☐ Am IT IS 2-10 □ Pm □521 D 3,670 □ 10-6 □-621 E +10 8-2-12 Rango de Tolerancia de los loaders 621D y 521D 3580 a 3740lbs Fecha Nombre Firma Hora Turno Supervisores 2.2.12 1. Perez Supervisor DA DB DC DD 8/2/12 MA OB OC OD 2-10 Supervisor OA OB OC OD Soto Supervisor Hast 1/2 12 GA GB GC GD Ma Stil E THE Supervisor

Fecha:

Fecha:

Supervisor de Producción:

Supervisión de Calidad:

Furnace # 2

Furnace 2

Run #1

Date 7/31/2012

From	То	Time (min)	Stage	Lot ID
13:16	13:51	35	2 nd Charge	F2/Jul/2012/#25
15:08	15:33	25	3 rd Charge	F2/Jul/2012/#25
20:34	21:34	60	Тар	F2/Jul/2012/#25
Total Sampling Time		120		

Run #2

Date 8/1/2012

From	То	Time (min)	Stage	Lot ID
8:19	8:39	20	1 st Charge	F2/Aug/2012/#1
10:46	11:26			F2/Aug/2012/#1
13:13	13:43	30	3 rd Charge	F2/Aug/2012/#1
17:52	18:22	30	Тар	F2/Aug/2012/#1
Total Samplir	ng Time	120		

Run #3

Date 8/2/2012

From	То	Time (min)	Stage	Lot ID
9:47	10:17	30	3 rd Charge	F2/Aug/2012/#3
16:16	16:46	30	•	F2/Aug/2012/#3
17:10	18:10	60	1 st Charge	F2/Aug/2012/#4
Total Sampling Time		120		

Battery Recycling...

Carga de Óxido en Horno No.2

-	/	carga	ac oxido cii itoriii	
1	No. Carga	Turno	Supervisor	Fecha
1.3/10	#25	10-6	us.	7-31-12

Datos de Carga Anterior					
Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección	Requerida (√)	
Charala	24"	lahr	() Si	(-) NO	

Y Y Y S (1)	Material para Car	ja lilikultusi
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40,000	40,030
Plomo	8,000	8,046
Polvo de Filtro	2	2
Hierro	3,800	2,500+ 1,000+Jac
Carbón	3,000	3.049
Soda	4,500	4,500
Mezcla Pesada por:	A-Kun	Num.Loader: 21-E

Flujo de A	ceite
Flama baja SP.	220 ± 10
Valor Real	220
Flama Media SP.	280 ± 10
Valor Real	281
Flama Alta SP,	300 ± 10
Valor Real	300

Acción		Tiempo	Tiempo Programado		Tiempo Real		
	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1 ^{er} Cargamento	Baja	20 min.	11/00	11:20	11,00	وعنها	OA OB OC O
Fundir	Media	1 Hr.	11:20	12:20	12:00	100	oA oB oC o
2 ^{do} Cargamento	Baja	20 min.	12:20	12:40	1:00	1250	aA aB aC a
Fundir	Media	1 Hr	12.40	1.40	1.50	2:50	□A □B □C ₪
3 ^{er} Cargamento	Baja	20 min.	1.40	2/00	2:50.	3:10	ØA ØB oC o
Fundir	Alta	2.15 Hr.	2100	4.15	3:40	8:30	ØA oB oC o
Descarga	Baja	45 min.	4:15	500	8:30	9:40	DA DB oC o
Tie	Tiempo Total			O Hr.			10hr women

Olla #6		Pulgadas		Conos de Escoria	Charola	Cono
Olla	a #6	Iniciales	Finales			1.
Carga #	127	5.5°n	33"	Cantidad		NA
Carga #			/			1100000
Carga #	Who my	W	am	Conos de Plomo	Olla □6 □7	□8 □9 □ n/a
Carga #	/"	/	7	Pulgadas de Plomo Olla #6	22'	

Ca	Características del Producto (√)						
Escoria en el Horno	() No	(Si, cantidad = 8°					
Escoria	() Liquida	() Espesa	() Gruesa				
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	(Normal				
Ladrillos	() Limpio	() Sucio					

Limpieza	del Horno (√)
Cajón de Plomo	() Limplo () Sucio
Canal	() Llmpio (4 Sucio
Boca del Horno	(/ Limpio () Sucio
Realizado por:	1-120.

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma.	Verificado Visualmente Firma:	Turno	No. Garga
7-71-12	☐ Am ☐ Pm	□621 D □521 D ⊡621 E	3,670	= +/0	A-Gij	uf-	□ 6-2 □ 2-10 □ 10-6	#25-

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	OA ØB OC OD	10-G	willedo K	uts	7-36-12
Supervisor	OA OB OC DO	6.)	Juan Grever	Dryan C.	7.7612
Supervisor	□A □B □C □D	2-10	N. Corps		7/31/12
Supervisor	oA oB oC oD				

Supervisor de Producción:	Fecha:	
Supervisión de Calidad:	Fecha:	

Battery) ecycling.	واسسب	and the second	Carga de	Óxido	en Hor	no No.2	2 , ,	
No. Carg	a		urno		ervisor		/ Fecha	V. 27
# 26		2	-	al (200	7/	31/12	
O. V	BERNTON PROVIDEN	No. 2. Properties	Datos	do Carea	Antorior	134 AH 17 WA CO		*C. 107
Escoria	Why .		o (Pulg.)		de Corrida	Corre	cción Requ	erida (🗸)
ESCOFIA		22"		1	msa.	()		(V) No
China		1 20		10m 40	mia.			
ales of the part			al para Car		A STANSON OF		Flujo de	
Materiale	:5		atrón(Lbs.)	Peso M	edido (Lbs.)	Flan	na baja SP.	220 ± 10
Óxido			<i>20</i> 00	40	070	— L v	alor Real	200
Plomo			∞	8.	020	Flam	a Media SP.	280 ± 10
Polvo de Filtr	0				500 171-50	$\dashv \vdash \lor$	alor Real	270
Hierro	7,00				500+800	Flar	na Alta SP.	300 ± 10
Soda	3000		3010			alor Real	300	
Mezcia Pesada	nor:	450	,	Num.Loa	der: 6218		alor iteal	1000
Mezcia resaua	por.)c~						
	第一般		Acompa	ñamiento	de la Carg	a	or other property of the	and the second
Acción		Flama	Tiempo		rogramado	Tiemp		Turno
Accion		1 Idilia	Patrón	Inicial	Final	Inicial	Final	0.0.0
1 ^{er} Cargamen	to	Baja	20 min.	9:40	9:10:00	9:40	10:40	ØA øB oC oD
Fundir		Media	1 Hr.	10:00	11:00	10:00	11:40	DA EB OC OD
2 ^{do} Cargamer	ito	Baja	20 min.	11:00	11:20	11:40	12:40	DA BB DC DD
Fundir		Media	1 Hr.	11:20	12:20	12:40	2040	OA BB OC DD
3 ^{er} Cargamen	ito	Baja	20 min.	1220160	12:60	2=40	3:00	OA BBOC OD
Fundir		Alta	2.15 Hr.	12:40	5:22	3:00	6:50	
Descarga		Baja	45 min.	2:55.	3:40-	6:50	7:40	DA UB UC UB
	Tiem	oo Total		6.0	00 Hr. 10hr			
17.03.04	of they 1	Pu	ilgadas	Conc	s de Escoria	Ch	arola	Cono
Olla #6	Jen a	Iniciale	in the second second	10				
Carga #	76-	33" such	2 11"	ļ	Cantidad			A
Carga #				Com	os de Plomo	-)lla 96 🗊 7 🕫	2 = 0 = n/a
Carga #			17		de Piomo Oli		7 N	3 U3 U 11/4
Carga #				Pulgadas	de Pionio On	a #0	a	
Car	acterí	sticas de	Producto	(√)	(The parties		4-111	- (-/)
Escoria en el Horno	() No	\	(-) Si, cantic	X	48-60-05-0			
Horno	() (((-) 0., carreta		Cajo	n de Plomo	() Lim	
Escoria	(-) Lic	quida	() Espesa	() Grues		Canal	(-) Lim	
Color del		egra	() Blanca	(-) Norma	.	del Horno	(TLim	
Humo Ladrillos	Falta	Hierro	Falta Carbón () Sucio		Rea	nzauo por.	Rafae	L Chir
Laurinos					ter (alexandra) de la constanta		Zavuntaka a	Commission
		AND COURSE DOOR AND	bilidad de Opera	CP20026-MillioniarSycationers for		Venficado		Supervisor
Fechaly	Hor	Loade Venfica		oferencia en Peso	Realizado Firma		te Turno	No: Carga
	□ A ₂	NAME AND ADDRESS OF THE PARTY O	SECURI CRESCIPION SEC	Si ZNo	ALEXANDERED AND ARTHUR	C	□ 6-2	111-
7/31/12	ØPn Ø2.00	n []521 [[]621 [3600	-60	Jers.		☑ 2-10 ☐ 10-6	1, 20,
		Rango	de Tolerancia d	e los loaders	621D y 521D:	3580 a 3740lb.	\$	K jarran
Supervisores		Turno	Hora	Nombi	e /	Firm	a	Fecha /
Supervisor		BoCoD	2-10 9	I Can	~ .			07/32/12
Supervisor		Ø □C □D	10-6 U	1:1lland	Keri	ass.		7-31-12
Supervisor		B oC dD	6-2	5	1201612	044	C	8-1-12
		BaCaD	0-2	Juan O	a ever	Julia	<i>J</i>	0 , , _
Supervisor	DA	الانا بان مر				V		

Fecha:

Fecha:

Supervisor de Producción:

Supervisión de Calidad:

Carga de Óxido en Horno No.2

No. Carga

Turno
Supervisor
Fecha

#1

Datos de Carga Anterior

Escoria
Plomo (Pulg.)

Tiempo de Corrida
Charala

22 " Jahrs () Si (-) No

Material para Carga							
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)					
Óxido	40,000	40,016					
Plomo	8,000	8,030					
Polvo de Filtro	2	١. ۵.					
Hierro	3,800	2,500+1,000+12					
Carbón	3,000	3,034					
Soda	4,500	4,500					
Mezcla Pesada por:	A- fees	Num.Loader: 691-6					

Flujo de A	ceite
Flama baja SP.	220 ± 10
Valor Real	22,
Flama Media SP.	280 ± 10
Valor Real	281
Flama Alta SP.	300 ± 10
Valor Real	300

		Tiempo	Tiempo Programado		Tiemp	o Real	_
Acción	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1er Cargamento	Baja	20 min.	8.70	8,50	X = 70	9230	OA OB OC et
Fundir	Media	1 Hr.	2.50	9:50	9.30	10:170	OA OB OC OC
2 ^{do} Cargamento	Baja	20 min.	90.50	10:10	10:170	11:40	□A □B □C øf
Fundir	Media	1 Hr.	10:10	11/110	11.40	12.42	□A □B □C €C
3er Cargamento	Baja	20 min.	11:10	11.70	12.40	2:05	DA DB DC ⊠C
Fundir	Alta	2.15 Hr.	11:30	1.45	2:05-	5,20	ØA □B □C □E
Descarga	Baia	45 min.	1.45	2:30	5:50	B: 525	ØA □B □C □I
Tiempo Total			6.0	00 Hr.		10hz. 6	Zombi

		Pulgadas		Conos de Escoria	Charola	Cono
Olla	#6	Iniciales	Finales			1/
Carga #	1/1	80"	5811	Cantidad		1940
Carga #	3. 4	, ,				
Carga #		Waw		Conos de Plomo	Olla	18 119 pm/a
Carga #	75.73	11 -		Pulgadas de Plomo Olla #6	27 "	

Car	racterísticas de	l Producto (√)	
Escoria en el Horno	() No	() Si, cantidad = 10 "		
Escoria	() Liquida	() Espesa	() Gruesa	
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	() Normal	
Ladrillos	() Limpio	() Sucio		

Cajón de Plomo	() Limpio (-) Sucio
Canal	() Limpio () Sucio
Boca del Horno	() Limpio () Sucio
Realizado por:	1 /2/CD

ALINE SOLVE WILLIAM	R	esponsabilio	lad de Ope	erador			bilidad de S	upervisor
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
	Ø Am □ Pm	☐621 D ☐521 D ☑621 E	2 /2	Si (21%)	10.	of.	□ 6-2 □ 2-10 □ 10-6	#1
8-1-12	4:00	Danas de	5,624	4-14	1 t- fey \$ 621D y 521D:35	80 a 3740lbs		

Supervisores	Turno	Hora	Nombre/	Firma	Fecha
Supervisor	GA ஜB GC GD	10-6	wilkedob"	cess:	8-1-12
Supervisor	□A □B □C □Đ	6-2	Jum Grever	Juan G	8-1-12
Supervisor	□A □B □C □D	2-10	Money		8/1/12.
Supervisor	□A □B □C □D		N/8 my		1

Supervisor de Producción:	Fecha:	
Supervisión de Calidad:	Fecha:	

A .			Carga de	Óxido	en Hori	no No	.2 , ,		
Vp. Car	ga		urno		rvisor		/ Fech	1a	
A FERRMAN		2	12	1 1 1 m		8	8/1/12.		
- S. M.		10	-10		ONPH-	1 0			
Angered States	NOT NEED YOU	J1520016000027	Datos	de Carna	Anterior	CONTRACTOR OF THE CONTRACTOR O	gragital property		
, Escori			o (Pulg.)	Tiempo (de Corrida	Co	rrección Re	querida (√)	
711		7.7		10h	zempr	() Si	(2) NO	
(horde		1 0.							
i mini			al para Carg	a	ENSAME OF A		Flujo de	Aceite	
Materia	les	Peso P	atrón(Lbs.)		edido (Lbs.)	_ F	lama baja SP.	. 220 ± 10	
Öxido		4000		40.0		- [Valor Real	200	
Plomo		8.000			70	- FI	ama Media SF	280 ± 10	
Polvo de Fil	itro	7		252014	500+500+3	300	Valor Real	270	
Hierro Carbón		3800		3050	307,5475		lama Alta SP.		
Soda		3000		4500			Valor Real	300	
Mezcla Pesad	a por:	1600		Num.Load		= -	Tarer (tout	1000	
PIEZCIA PESAG	a pott	Jero S.	- 1/4-1/1	1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				2111-22-11-1111	
and the state of the state of			Acompai	ñamiento	de la Carga	refit (s.) Ha			
- • •		P1	Tiempo	Tiempo P	rogramado	Tier	npo Real	Turno	
Acción		Flama	Patrón	Inicial	Final	Inicial			
1 ^{er} Cargame	ento	Baja	20 min.	6:50	770	6.50.			
Fundir		Media	1 Hr.	7:10	8:10	2:10.		ØA ⊕B ⊕C ⊕D	
2 ^{do} Cargame	ento	Baja	20 min _e	8:10	8:30	8-10		ØA □B □C □D	
Fundir		Media	1 Hr.	8:30	9:50	9:50			
3 ^{er} Cargame	ento	Baja	20 min.	9:30	9:50	10:5			
Fundir		Alta	2.15 Hr.	9:50	12:05.	12-30		DA &B DC DD	
Descarga		Baja	45 min.	15:02.	12:50-	4:40	0.00		
	Tiem	po Total		0.0	ло пг.	100	15 40m	171	
Olla#	6	Pu Iniciale		Cono	s de Escoria		Charola	Cono	
Carga #	#2	58"	36n	C	antidad			TAUM	
Carga #									
Carga #		1	uff		s de Plomo	- H.C. G. O		□8 □9 □ n/a	
Carga #				Pulgadas	de Plomo Olla	#6 22			
rain autobinista	ractor	ícticae de	l Producto (1/2000	tiese				
Escoria en el			(Si, cantida		5000			no (√)	
Horno	() N	10	(V) SI, cantida	ad = /	Cajón	de Plomo		mpio () Sucio	
Escoria	(V) L	iguida	() Espesa	() Grues	a	Canal	(/ Y Li	mpio () Sucio	
			() Blanca	-	Boca del Horno ()		mpio () Sucio		
Color del Humo		Negra a Hierro	Falta Carbón	(A Normal Realizado por:		S - C	systa		
Ladrillos	(/) L	impio	() Sucio					/	
	OBS WIND POLICE	Pococca	i pilidad de Operad	orthonorm	rotation services	Res	consabilidad	de Supervisor	
		Loade	SURFACE PROPERTY STATE OF THE SECOND	formacia on	0128 PROVINCE	Verific	ado		
Fecha	Ho	ra Verifica		Peso	Realizado Firma:	Visualn Firm		no No Carga	
	ПА	ศ 🗆 621 โ		Si 🗹 No	1CVUS-	N	□ 6-2		
18/1/12	□Z/Pi	m ☐521 ☐ 12621 E	3690 =1	20	C 4 C 30	-	2-1 □ 10-		
	2:3		· /	-30)		12.00	•	
na de la companya de	11000000	Rango	de Tolerancia de	los loaders 6	21D y 521D:3	580 a 3740	lbs (
Company and the company of the compa	000000000000000000000000000000000000000	SOLUNG HUNDING ON	MANAGEMENT CONTRACTOR OF THE PARTY	473318090809090000000000000000000000000000	ACQUITMONE PLATERING COLORES	ACTORNATION NOTICE			
Supervisores		Turno	Hora	Nombr	e /	7 Fin	ma	- Fecha	
Supervisor	рA	oB oC oD	2-0 K	l Const	2	-		0/1/16	
Supervisor	□A	®B° □C □D	10-6 WI	Heros k	cuy' a	15°		8-1-12	
Supervisor	□A	oB oC oD							
Supervisor	DΑ	оВ оС оО							
· · · · · · · · · · · · · · · · · · ·			· · · · /				-	A11	
Supervisor d	e Produc	cción:	7.	Laterton		Fecha:	2 090	she	
Supervisión	de Calida	ad:	1	1		Fecha:	1	V	
ille			1	, (a	30	1.1	2		
Topia	500	o cra	hoja i	ra -	vota C.	.97	<u>_</u>		

Bättery (Recycling.

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha	
#3	10-6	w-key	8-2-12	

Datos de Carga Anterior								
Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)					
-harola	22"ollatt6	10 hrs 90 win	() Si () No					

Material para Carga						
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)				
Óxido	40,000	40,020				
Plomo	8,000	8017				
Polvo de Filtro	2	2 usp				
Hierro	3,500	2,500/1,500/,00				
Carbón	3,000	9.010				
Soda	4,000	4,500				
Mezcla Pesada por:	D. Ovala	Num.Loader: 691-6				

Flujo de A	ceite
Flama baja SP.	220 ± 10
Valor Real	221
Flama Media SP.	280 ± 10
Valor Real	281
Flama Alta SP.	300 ± 10
Valor Real	300

Acción	i ,	Tiempo	Tiempo P	rogramado	Tiemp	Tiempo Real		
	Flama	Patrón	Inicial	Final	Inicial	Final	Turno	
1 ^{er} Cargamento	Baja	20 min.	5130	5250	5-30	6:30	oA ⊵B oC oE	
Fundir	Media	1 Hr.	5250	6:50	6:30	7:70	nA nB nC නිර්	
2 ^{do} Cargamento	Baja	20 min.	6:50	7:10	7:30	8-30	OA OB OC OC	
Fundir	Media	1 Hr.	7:10	8:10	8-70	9,30	OA GB OC OT	
3 ^{er} Cargamento	Baja	20 min.	8:10	8130	9,30	10140	DA DB DC RE	
Fundir	Alta	2.15 Hr.	830	10:45	10,42	SETTY:	OOA OB OC OD	
Descarga	Baja	45 min.	10245	11:30	1600mg	5.0	nA nB nC nD	
Tie			0 Hr.		11 hu (1	2 mm		

Olla #6		Pulgadas Iniciales Finales		Conos de Escoria	Charola	Cono
				1		
Carga #	#3	36"	16	Cantidad	V	WA
Carga #						
Carga #				Conos de Plomo	Olla 06 07 08 09 pm	
Carga #		-		Pulgadas de Plomo Olla #6	20"	

Ca	racterísticas d	el Producto (Limnieza	del Horno (√)	
Escoria en el Horno	() No	(*) Si, cantida	d = 9 "	Cajón de Plomo	() Limpio (¿) Sucio
Escoria	(—) Liquida	() Espesa	() Gruesa	Canal	() Limpio () Sucio
ESCOTIA	(-) Elquida	() Laptad	() 0.000	Boca del Horno	() Limpio () Sucio
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	(Normal	Realizado por:	1/200
Ladrillos	₹) Limpio	() Sucio		(<i>J</i> .

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
8-1-12	☑Am □Pm	□621 D □521 D ⊡621 E	J. 650	□ Si ☑ No = -/0	0.0%/a	up.	□ 6-2 □ 2-10 □ 10-6	#3

Supervisores	Turno	Hora	Nombre /	Firma	Fecha
Supervisor	nA ⊗8 nC nD	10-6	wil feed 5	wh.	8-2-12
Supervisor	OA OB OC D	10-2	Juan G. Rehon	Dadu G	2.2. V2
Supervisor	ØA □B □C □D	2-10	al Poren	()	8/02/12
Supervisor	oA oB oC oD				

	Fecha:	
	Fecha:	,
por visita les falt	aba mon	for Eguipo Con
	our visita les falt	Fecha:

Carga de Óxido en Horno No.2 No. Carga Fecha Juan Goderier 8-2-12

Datos de Carga Anterior							
0 / Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección	Requerida (√)			
Charles	200	11 hr young	() Si	() No			

r energy of page 179	Material para Car	ga
Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40,000	40,075
Plomo	8.000	18.21
Polvo de Filtro	â -	2 -
Hierro	3,800	2,500+500+500
Carbón	7,000	3.000
Soda	4.500	4,500
Mezcla Pesada por:	Jula erpinosa	Num.Loader: 6218

Flujo de A	Flujo de Aceite					
Flama baja SP.	220 ± 10					
Valor Real	200					
Flama Media SP.	280 ± 10					
Valor Real	270					
Flama Alta SP.	300 ± 10					
Valor Real	300					

the day the stock		Acompa	ñamiento	de la Carga	any of the six	unan surv	
		Tiempo	Tiempo Programado		Tiempo Real		
Acción	Flama	Patrón	Inicial	Final	Inicial	Final	Turno
1 ^{er} Cargamento	Baja	20 min.	5:10	5:30	5:10	6:10	ØA oB oC oD
Fundir	Media	1 Hr.	5,30	6:30	6:10	7:30	ØA OB OC OD
2 ^{do} Cargamento	Baja	20 min.	6:30	4:50	7:30	8:30	ØA □B □C □D
Fundir	Media	1 Hr.	6:50	7:50	8:30	9:30	øA oB oC oD
3 ^{er} Cargamento	Baja	20 min.	7:-10	8:40	8:30	10:30	OA OB &C OD
Fundir	Alta	2.15 Hr.	8.0	W:25-	10:30	3:40	□A □B ∠C □D
Descarga	Baja	45 min.	105.75	11:00	3:40	490	□A □B □C □D
Tie	mpo Total			0 Hr.		11/hr -	Duin

Olla #6		Pulgadas		Conos de Escoria	Charola	Cono
Olia	1#6	Iniciales	Finales			
Carga #	Fu	Wisch	Basion	Cantidad		JA 0111
Carga #	#4	71"	49"			
Carga #	1/10	1/ 11	V/	Conos de Plomo	Olla 🛮 6 🖒 7 🕻	ı8 ¤9 □ n/a
Carga #	1/xoth	YNOW	TARA	Pulgadas de Plomo Olla #6	22"	

Ca	racterísticas d	el Producto (√)
Escoria en el Horno	() No	(_) Si, cantida	d = g''
Escoria	() Liquida	() Espesa	() Gruesa
Color del Humo	() Negra Falta Hierro	() Blanca Falta Carbón	(/ Normal
Ladrillos	() Limpio	() Sucio	

Limpieza del Horno (√)						
Cajón de Plomo	(/ Limpio () Sucio					
Canal	() Limpio () Sucio					
Boca del Horno	() Limpio () Sucio					
Realizado por:	D. Curriel					

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
5 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2	□ Am □ Pm	□621 D □521 D ⊡621 E	3.679	= + 19	Tranks 812 asc	^	☐ 6-2 ☐ 2-10 ☐ 10-6	IF 4
8-2-12	1230	Rango de	Tiolerancia	de los loaders	621D y 521D:35	30 a 3740lbs		2462627630

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	OA OB OC OD	6->	Juan to parier	Queles Go	8.2-12
Supervisor	.øA □B □C □D	2-10	al Com		8/2/12
Supervisor	oA oBacoD	10-6	Israel Soto	Post	2-01905/-12
Supervisor	oA oB oC oD	1/A. Th	1/x BIL	The The	1/x ZAN

Supervisor de Producción:	*	Fecha:		
Supervisión de Calidad:	1 1	Feçha:	1	11
Kin Illand la o	handrate and	2 / /	4. 0 0	1/1/2
Kproblema com la r	ukrovaluvla noesta c	aum ww	8	15/16
fota corriendo manal	20			
(2) COLLIGIO 1. 20000	Dágina 1 do 1		DDD_E_24.	_ 🗠

Página 1 de 1

PRD-F-24-E

Appendix B

Method 5 / 12
Particulate Matter
&
Inorganic Lead
Calculations

Furnace # 1



SUMMARY OF RESULTS

Project Name:	Battery Recycling Corp.
Project Number:	39400681.00001
Site Location:	Furnace 1
Test Location:	Baghouse Inlet Duct

Parameters	Run - 1	Run - 2	Run - 3	Average
Run Times	14:03 - 20:06	12:36 - 20:03	11:01 - 19:23	
Date	7/31/2012	8/1/2012	8/2/2012	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	75.685	66.270	72.768	71.574
Moisture Content (% Vol.)	4.4	4.8	4.5	4.5
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (°F)	178.8	177.9	179.3	179
Stack Velocity (ft/min.)	1,983	1,744	1,943	1,890
Gas Flow Rate (ACFM)	36,387	31,995	35,657	34,680
Gas Flow Rate (SCFM)	29,458	25,960	28,885	28,101
Gas Flow Rate (DSCFM)	28,174	24,723	27,598	26,832
Percent Isokinetic	99.6	99.4	97.7	98.9
Particulate Conc. (Grains/DSCF)	0.0019	0.0056	0.0041	0.0039
Particulate Conc. (MG/DSCM)	4.292	12.787	9.462	8.847
Particulate Mass Rate (pounds/hr)	0.453	1.184	0.978	0.872
Lead Conc. (Grains/DSCF)	0.000017	0.000022	0.000008	0.000016
Lead Mass Rate (pounds/hour)	0.0041	0.0048	0.0020	0.0036

STACK TEST CALCULATIONS

Part. Weight:

,g

29.91 **BRC** Barom. Psr.: Calculated Project: Static Psr.: -8.2 Ps: 29.307 Project No: Source: Furnace - 1 18.348 1.8419 As: Delta H @: 0.9734 0.000412 1 An: Run No.: Gamma: 7/31/2012 0.838 Pitot Coef.: Date: Sample Volume: 81.64 58 Stack Dia.: 0.275 120 Sample Time: Nozzle Dia.: in. 20 73.3 H2O Gain: O2 Conc.: ,ml 0.0092

1

CO2 Conc.:

TRAVERSE POINT NUMBER	VELO DELT Actual		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.28	0.52915	1.38	99	182
2	0.28	0.52915	1.38	100	181
3	0.25	0.5	1.28	100	182
4	0.25	0.5	1.28	102	184
5	0.30	0.547723	1.55	103	182
6	0.25	0.5	1.30	95	185
7	0.22	0.469042	1.15	95	180
8	0.23	0.479583	1.18	95	181
9	0.23	0.479583	1.18	95	181
10	0.23	0.479583	1.18	96	180
11	0.22	0.469042	1.15	96	179
12	0.20	0.447214	1.05	96	180
13	0.35	0.591608	1.80	90	175
14	0.42	0.648074	2.15	91	176
15	0.36	0.6	1.85	92	177
16	0.36	0.6	1.85	93	179
17	0.35	0.591608	1.80	94	179
18	0.32	0.565685	1.65	95	179
19	0.30	0.547723	1.55	96	180
20	0.24	0.489898	1.25	96	178
21	0.25	0.5	1.30	96	177
22	0.29	0.538516	1.50	96	174
23	0.30	0.547723	1.55	96	171
24	0.28	0.52915	1.45	96	170
AVERAGE	0.2816667	0.528336	1.4483333	95.95833333	178.83333

Project: BRC

Project No: 0 Source: Furnace - 1 Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 3.45 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 75.685 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.04

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO + %N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo))

Ms = 28.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 1,983.2 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 36,387.44 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 29,458.35 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 28,174.00 DSCFM

Vsstd = Qstd/As

Vsstd = 1535.56 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 1.00

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0019

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 0.45

STACK TEST CALCULATIONS

H2O Gain:

Part. Weight:

BRC Project: 0 Project No: Source: Furnace - 1 Run No.: 2 8/1/2012 Date: 72.33 Sample Volume: 120 Sample Time: 20 O2 Conc.: CO2 Conc.:

29.94 Barom. Psr.: Calculated -8.3 29.330 Ps: Static Psr.: 18.348 1.8419 Delta H @: As: An: 0.000412 0.9734 Gamma: 0.838 Pitot Coef.: 58 Stack Dia.: in. 0.275 Nozzle Dia.: "in.

,ml

g

70.4

0.0240

TRAVERSE POINT NUMBER	VELO DELT Actual		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.25	0.5	1.30	104	177
2	0.26	0.509902	1.35	104	181
3	0.23	0.479583	1.20	105	186
4	0.23	0.479583	1.20	106	182
5	0.21	0.458258	1.10	106	184
6	0.18	0.424264	0.92	107	180
7	0.18	0.424264	0.92	107	181
8	0.21	0.458258	1.10	108	180
9	0.21	0.458258	1.10	108	180
10	0.16	0.4	0.85	109	180
11	0.15	0.387298	0.80	109	175
12	0.26	0.509902	1.35	109	138
13	0.18	0.424264	0.92	100	177
14	0.21	0.458258	1.10	100	178
15	0.21	0.458258	1.10	100	179
16	0.21	0.458258	1.10	100	179
17	0.26	0.509902	1.35	101	174
18	0.25	0.5	1.30	101	176
19	0.25	0.5	1.30	95	181
20	0.21	0.458258	1.10	95	181
21	0.24	0.489898	1.25	96	180
22	0.24	0.489898	1.25	97	181
23	0.21	0.458258	1.10	98	180
24	0.21	0.458258	1.10	99	180
AVERAGE	0.2170833	0.464712	1.1316667	102.6666667	177.9167

Project: BRC

Project No: 0 Source: Furnace - 1 Run No.: 2

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 3.31 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 66.270 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.05

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO + %N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo))

Ms = 28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 1.743.8 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 31,994.97 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 25,959.59 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 24,723.33 DSCFM

Vsstd = Qstd/As

Vsstd = 1347.49 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.99

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0056

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.18

STACK TEST CALCULATIONS

29.97 Project: BRC Barom. Psr.: Calculated -8.5 0 Ps: 29.345 Project No: Static Psr.: Source: Furnace - 1 1.8419 18.348 Delta H @: As: An: 0.000412 3 0.9734 Run No.: Gamma: 8/2/2012 0.838 Date: Pitot Coef.: 79.35 58 Stack Dia.: Sample Volume: ,in. 0.275 120 Sample Time: Nozzle Dia.: in. 20 72.1 O2 Conc.: H2O Gain: ,ml 1 0.0195 Part. Weight: CO2 Conc.: ,g

TRAVERSE POINT NUMBER	VELO DELT Actual		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.29	0.538516	1.50	97	175
2	0.35	0.591608	1.82	97	177
3	0.33	0.574456	1.70	97	179
4	0.31	0.556776	1.60	98	184
5	0.29	0.538516	1.50	99	181
6	0.26	0.509902	1.35	100	182
7	0.23	0.479583	1.20	103	180
8	0.24	0.489898	1.25	104	181
9	0.24	0.489898	1.25	105	180
10	0.23	0.479583	1.20	106	180
11	0.20	0.447214	1.05	107	178
12	0.23	0.479583	1.20	107	176
13	0.30	0.547723	1.55	106	178
14	0.32	0.565685	1.68	106	180
15	0.30	0.547723	1.55	105	181
16	0.30	0.547723	1.55	105	183
17	0.28	0.52915	1.45	104	183
18	0.27	0.519615	1.40	104	184
19	0.29	0.538516	1.50	104	184
20	0.29	0.538516	1.50	104	180
21	0.20	0.447214	1.05	104	180
22	0.24	0.489898	1.25	104	176
23	0.24	0.489898	1.25	104	173
24	0.24	0.489898	1.25	104	167
AVERAGE	0.2695833	0.517796	1.4	103.0833333	179.25

Project: BRC

Project No:

0 Source: Furnace - 1

Run No.:

3

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd =

3.39 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd =

72.768 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo =

0.04

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO + %N2)

Md =

29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo))

Ms =

28.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs =

1.943.4 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa =

35,656.68 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs =

28,885.28 SCFM

Qstd = Qs(1 - Bwo)

Qstd =

27,598.16 DSCFM

Vsstd = Qstd/As

Vsstd =

1504.17 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

ls =

0.98

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs =

0.0041

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr =

0.98



TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 1	TEST DATE:	7/31/2012
TRAIN I.D.	1	TEST NO.:	1
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	769.5	817.6	48.1
2	711.3	717.6	6.3
3	581.9	585.8	3.9
4	849.6	864.6	15.0
5			0.0
6			0.0
7			0.0
TOTAL	2912.3	2985.6	73.3

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	49.8950	49.9039	0.0089
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0089
FILTER #1	0.3516	0.3519	0.0003
FILTER # 2			0.0000
IMPINGERS			0.0000

^{*} subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

ARTICULATE COLLECTED (excluding impinger catch)	0.0092
OMMENTS:	



TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681	
SOURCE:	Furnace 1	TEST DATE:	8/1/2012	
TRAIN I.D.	1	TEST NO.:	2	
COLLECTED BY:	MSM	CHKD BY:		

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	772.8	816.0	43.2
2	744.1	750.4	6.3
3	602.9	607.2	4.3
4	860.7	877.3	16.6
5			0.0
6			0.0
7			0.0
TOTAL	2980.5	3050.9	70.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	50.2163	50.2401	0.0238
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0238
FILTER # 1	0.3448	0.3450	0.0002
FILTER # 2			0.0000
IMPINGERS			0.0000

^{*} subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0240
COMMENTS:	



TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681	
SOURCE:	Furnace 1	TEST DATE:	8/2/2012	
TRAIN I.D.	1	TEST NO.:	3	
COLLECTED BY:	MSM	CHKD BY:		

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	736.7	782.8	46.1
2	692.3	701.9	9.6
3	583.4	585.2	1.8
4	902.5	917.1	14.6
5			0.0
6			0.0
7			0.0
TOTAL	2914.9	2987.0	72.1

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	50.8247	50.8439	0.0192
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0192
FILTER # 1	0.3529	0.3532	0.0003
FILTER # 2			0.0000
IMPINGERS			0.0000

^{*} subtract reagent blank from probe wash

PARTICULATE COLLECTED (excluding impinger catch)

TOTAL PARTICULATED COLLECTED

0.0195

COMMENTS			
COMMENTS:			

Project:

Battery Recycling Company

Project No.: 39400681 Date:

August 2, 2012

Lead Mass Emission Calculations

INPUT PARAMETERS

Lead	Total ug	grams/sample	Vmstd	Qstd	Mass Rate (lbs/hr)	Lead Concentration (grains/dscf)	Lead Concentration (mg/dscm)
Run 1	83	0.0000830	75.685	28,174	0.0040869	0.0000169	0.0387
Run 2	96.3	0.0000963	66.270	24,723	0.0047522	0.0000224	0.0513
Run 3	39,5	0.0000395	72.768	27,598	0.0019816	0.0000084	0.0192
			Ave	rage	0.0036069	0.0000159	0.0364
					Compliance Limit	0.000870	2.0
					Tons/year	0.01580	

Lead Mass Rate (lb/hr)

Lead Mass Rate (Tons/year)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

mass rate (Tons/year) = mass rate(lbs/hr) * 24(hrs) * 365(days) / 2000(lbs/ton)

Mn= grams/sample

Qstd= stack gas flow rate (dscfm) Vmstd= volume of air sample (@ stp)



Pre-Test / Cyclonic Flow Data Sheet

Project Name: _	Battery Recycling Co.	Test No.:	Pre Test	Stack Dimensions:	58"	_
Project No.: _	39400681.00001	Location:	Furnace # 1	Barometric Pressure:		in. Hg
Date:	7/30/2012	Personnel:	MM,TG,RR	Static Pressure:	-6.3	in. H₂O

Pre-T	raverse / Cyc	lonic Flow (Check
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp
1	0.36	1.0	183
2	0.38	1.0	183
3	0.42	1.4	183
4	0.42	2.6	183
5	0.36	0.0	183
6	0.36	7.0	183
7	0.28	8.0	182
8	0.28	6.0	182
9	0.26	6.0	182
10	0.26	7.0	182
11	0.26	9.0	183
12	0.3	2.0	183
13	0.35	0.0	
14	0.38	1.0	183
15	0.42	1.5	183
16	0.4	3.0	183
17	0.4	2.0	183
18	0.36	0.0	183
19	0.34	0.0	183
20	0.34	1.0	183
21	0.3	2.0	182
22	0.3	5.0	182
23	0.28	5.0	182
24	0.26	6.0	182
Average	0.34	3.23	183

PITOT LEAK CHECK (> 3")				
INITIAL	(+)	(-)		
FINAL	(+)	(-)		

NOTES:				

Furnace # 1

Method 5 / 12
Particulate Matter &
Inorganic Lead
Field Data Sheets



STACK TEST DATA SHEET

29.91 Battery Recycling Co. Barom. Psr.: Project: Static Psr.: Project No: 39400681.00001 Delta H @: Source: Furnace #1 Duct 0.9734 Gamma: Run No.: 7-31-12 Pitot Coef.: Date: Stack Dia.: Filter No.: Stack Area: Meter Box I.D.: Sample Box No.: Port Length: 3.0" 34 Port Dia.: **Probe Heater Setting:** 250

Schematic of Stack

Filter G1015

Personnel:				Probe Liner:	Glass			+1140	v 610	15	
TRAVERSE POINT NUMBER	SAMPLII TIME Clock		VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
Ì	14:03	0.0	0.28	1.38	106.075	99	254	254	182	64	2
2		5.0	0.28	1.38	109.40	100	257	251	181	59	2
3		10.0	0.25	1.28	111.80	100	257	249	182	52	3
4		15.0	0.25	1.28	115.70	102	256	250	184	53	3
5		20.0	0.30	1.55	11930	103	256	253	182	54	3
6	14:20/i5:43	25.0	0.25	1.30	122.40	95	257	253	185	57	3
7		30.0	0.22	1.15	125.80	95	258	257	180	51	3
8		35.0	0.23	1.18	128.90	95	257	253	181	53	3
9		40.0	0.23	1.18	132, 20	95	257	253	18-1	54	3
10		45.0	0.23	1.18	135.00	96	257	258	180	55	3
1)		50.0	0.22	1,15	137.90	96	257	250	179	55	3
12		55.0	0.20	1.05	141.10	96	258	253	180	55	2
10	16:18/19:06	1.00	0.35	1.80	144, 110/144,205	90	246	262	175	58	4
2	7.1	1.05	0.42	2.15	148.00	91	240	241	176	55	4
3		1.10	0,36	1.85	151.90	92	241	238	177	58	4
4		1.15	0,36	1.85	155.85	93	240	238	179	59	4
5		1.20	0.35	1.80	159,50	94	241	237	179	60	3
6		1.25	0.32	1.65	164.00	95	241	240	179	61	3
7		1.30	0.30	1.55	167.00	96	241	240	180	55	3
8		1.35	0,24	1.25	171.00	96	241	238	178	52	3
9		1.40	0.25	1,30	173,90	96	241	244	177	51	3
10		1.45	0,29	1.50	177.60	96	241	243	174	51	3
11		1.50	0.30	1.55	180.80	96	241	240	171	51	3
12		1.55	0.28	1,45	184.50	96	241	244	170	51	3
	20:06	2.00		100 100	188, 315	•					
		245									
AVERAGE					81.64						

LEAK CHĘCKS				
Pitot impact:				
Pitot static:				
Train initial: 0.00/5	0.005"			
Train Final: (), 100				

I.D. No.:	Ø.	27
1	2.21	60 0.215
2	0	E 0.275
3	2	50 0.275
Avg.	ad	30 0.275

	STACK GA	S ANALYSIS	
	CO2	02	co
1	1.0	20.0	
2	1.0	20.0	
3			
Avg.	#DIV/0!	#DIV/0!	

NOTES: Pendcharging Dend of charging

leak check between posts.

Page: 1 of 4



M5/M12 TEST LAB DATA SHEET

PROJECT:	Battery Recycling	JOB NO.:	39400681.00001
SOURCE:	Furnace # 1 Duct	DATE:	7-31-12
TRAIN I.D.:		TEST NO.:	1
COLLECTED BY:	MsM	CHKD. BY:	11

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g		
1	769.5	817.6	43.1		
2	711.3	717.6	6.3		
3	581.9	585.8	3.9		
4	349,6	864.6	15,0		
5					
6					
7					
TOTAL	2912.3	2985.6	73,3		

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	49.8950	49.9039	0.0089
REAGENT BLANK			
CORRECTED PROBE	NASH*		
#1 FILTER G 1045	0.3516	0.3519	0.0003
#2 FILTER			
IMPINGERS			
PARTICULATE COLLE	CTED		

^{*}subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g



STACK TEST DATA SHEET

Battery Recycling Co. Project: 39400681.00001 Project No: Furnace # 1 Duct Source: Run No.: 8-1-12 Date:

Filter No.: Meter Box I.D.: 03 Sample Box No.:

Probe Heater Setting: 250 MM TG RR Personnel:

29.94 Barom. Psr.: -8.3 Static Psr.: 1.8419 Delta H @:

0.9734 Gamma: Pitot Coef.: 58" Stack Dia.:

Stack Area: 3.0" Port Length: 3" Port Dia.:

Glass Probe Liner:

Schematic of Stack

pitot 10 PT-15

Personnel:	MM TG	K /K		Probe Liner:	Glass						
TRAVERSE POINT NUMBER	SAMPLIN TIME Clock	NG Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	12:36	0.0	0.25	1.30	189.250	104	241	240	177	68	3.0
2		5.0	0.26	1.32	192.80	104	239	239	(8)	42	3.0
3		10.0	6.23	1.20	196.50	105	238	240	186	64	a.5
4		15.0	0.23	1.20	199,10	106	239	240	185	61	2.5
5		20.0	0.21	1.10	262,70	106	OYC	241	184	60	3.2
6		25.0	0.18	0.92	205.30	107	240	240	180	59	2
7		30.0	0.18	0.92	208.10	107	241	242	181	57	2
8		35.0	0.21	1.10	211.00	108	241	240	180	56	3
9		40.0	0.21	1.10	213.60	108	238	238	180	57	3
10		45.0	0.10	0.85	216.70	109	239	241	180	57	2
11		50.0	0.15	0.80	219.40	109	239	243	175	560	2
12		55.0	0.26	1.35	222.00	109	235	239	138	56	2
10	13:36/14:55	1.00	0.18	0.92	225.000/225.065	100	242	246	177	64	2
2	-	1.05	0.21	1.10	227.90	100	239	242	178	52	3
3		1.10	0.21	1.10	230.70	100	236	242	179	52	3
4		1.15	0.21	1.10	233,70	100	235	237	179	54	3
5		1.20	0.26	1.35	236.60	101	241	242	174	55	3
6	(3)	1.25	0.25	1.30	239.80	101	239	242	176	55	3
7 3	15:25/19:33	1.30	0.25	1.30	243,150	95	243	242	181	62	3
8	/	1.35	0.21	1.10	246.00	95	240	240		40	3
9		1.40	0.24	1.25	249.10	90	241	238	180	46	3
10		1.45	0.24	1,25	252.10	97	243	241	181	47	3
11		1.50	0.21	1.10	255.80	98	242	241	180	47	2
12		1.55	0.21	1.10	258.90	99	242	241	130	49	
	20:03	2.00			261.580	183				dt 23	
		248									
AVERAGE					72.33						

LEAK CHECK	S
Pitot impact:	L.V.
Pitot static:	/
Train initial: 0,00 (5	0,0060"
Train Final: 0 (Y)@10	0.005

NOZZLE ME	ASUREMENT
I.D. No.:	
1	0,270
2	0.270
3	0.270
Avg.	0.270

	STACK GA	S ANALYSIS	
	CO2	O2	co
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: Oend of 1st charge @ Ind charge 3 tapping

Operator Signature:



M5/M12 TEST LAB DATA SHEET

PROJECT:	Battery Recycling	JOB NO.:	39400681.00001
SOURCE:	Furnace # 1 Duct	DATE:	8-1-12
TRAIN I.D.:	3	TEST NO.:	2
COLLECTED BY:	Msm	CHKD. BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	772.8	816.0	43.2
2	744.1	150,4	6.3
3	602.9	607.2	4.3
4	860.7	877.3	16.6
5			
6			
7			
TOTAL	2930.5	3050,9	70,4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	50.2163	50,2401	0.2238
REAGENT BLANK			
CORRECTED PROBE	WASH*		
#1 FILTER	0.3448	०,३५५०	0,0002
#2 FILTER			
IMPINGERS			
PARTICULATE COLLE	CTED		

^{*}subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g



Probe Heater Setting:

STACK TEST DATA SHEET

29,97 Project: Battery Recycling Co. Barom. Psr.: -8.5 Static Psr.: 39400681.00001 Project No: 1.8419 Delta H @: Furnace #1 Duct Source: 0,9734 Gamma: Run No.: 8-2-12 Pitot Coef.: Date: 58" Stack Dia.: Filter No.: Stack Area: Meter Box I.D.: 3.0" Sample Box No.: Port Length:

250

Port Dia.:

Schematic of Stack

Personnel:	MM TG	RR		Probe Liner:	Glass						
TRAVERSE POINT NUMBER	SAMPLII TIME Clock		VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
I	11:01	0.0	0.29	1.50	261,725	97	234	240	1175	62	3
2	11:01	5.0	0.35	1.82	205.10	97	238	239	177	57	3
3		10.0	0.33	1.70	269.00	97	240	240	179	50	3
4		15.0	0.31	1.100	272.70	98	239	239	184	60	3
5		20.0	0.29	1.50	276.40	99	239	238	181	60	3
6	3	25.0	0.26	1.35	280.00	100	241	240	182	60	3
7	11:31/14:58	30.0	0.23	1.20	283.245	103	240	239	180	64	2
8		35.0	0.24	1.25	286.40	104	239	240	181	58	2
9		40.0	0.24	1.25	289.50	105	241	238	180	55	2
10		45.0	0,23	1.20	292.70	100	240	240	180	55	2
()		50.0	0,20	1.05	295.70	107	240	239	178	56	2
12	(2)	55.0	0.23	1.20	298.80	107	239	238	176	56	2
- (15:28/18:23	1.00	0.30	1.55	301,940/302.100	100	240	242	178	63	2
2	-	1.05	0.32	1.68	304.00	106	237	238	180	60	2
3	3.7	1.10	0.30	1,55	305.20	105	237	237	181	60	2
4		1.15	0.30	1,55	308,80	105	241	239	183	56	2
5		1.20	0.28	1.45	311.90	104	239	240	183	57	2
6		1.25	0.27	1.40	315.10	104-	242	242	184	57	2
7		1.30	0.29	1.50	319.10	104-	240	240	184	57	2
9		1.35	0.29	1,50	325.90	104-	241	240	130	58	2
9		1.40	0.20	1.05	329.00	104	241	243	180	58	2
10		1.45	0,24	1.25	332.20	104	243		176	58	2
17		1.50	0.24	1.25	335.70	104	241	242		59	2
12		1.55	0.24	1,25	338,70	104	242	244	167	60	2
	19:23	2.00			341.075						
		2,85									
AVERAGE					79.350						

LEAK CHECKS	
Pitot impact:	
Pitot static:	1
Train initial: 0.0€15*	0.0 @ 10"
Train Final: 0.0 E/0	0.085"

NOZZLE ME	ASUREMENT	
I.D. No.:		_
1	.275	
2	.275	
3	.275	
Avg.	. 275	

	STACK GAS	ANALYSIS	
	CO2	O2	co
1	i,o	20.0	
2	1,0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: 1 1st charge @ tapping

Page:	1	of 4	



M5/M12 TEST LAB DATA SHEET

PROJECT:	Battery Recycling	JOB NO.:	39400681.00001
SOURCE:	Furnace # 1 Duct	DATE:	8-20-12
TRAIN I.D.:	5	TEST NO.:	3
COLLECTED BY:	MSM	CHKD. BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	736,7	782.8	46.1
2	692.3	701.9	9.6
3	583.4	585.2	1.8
4	902.5	917.1	14.6
5			
6			
7			
TOTAL	2914.9	2987.0	72.1

<u>PARTICULATE</u>

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	50.8247	50.8439	0,0192
REAGENT BLANK			
CORRECTED PROBE	WASH*		
#1 FILTER 6/205	0.3529	0.3532	0.0003
#2 FILTER			
IMPINGERS			
PARTICULATE COLLE	CTED		

^{*}subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

Pre-Test / Cyclonic Flow Data Sheet

Project Name: Battery Recycling Co. Test No.: Pre-Test Stack Dimensions: 60"

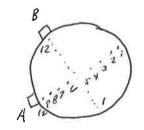
Project No.: 39400681.00001 Location: Furnau # Barometric Pressure: in. Hg

Date: 7/30//2 Personnel: MM RRTG Static Pressure: -6.3 in. H₂O

Test Time: Start: 16:40 Stop: 16:57

Pre-T	Pre-Traverse / Cyclonic Flow Check			
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp.	
1	0.36	1.0	183	
2	0.38	1.0	183	
3	0.42	1.4	183	
4	0.42	2.6	183	
5	0.36	Ø	183	
6	0.36	7.0	183	
7	0.28	8.0	182	
8	0.28	6.0	182	
9	0.26	6.0	182	
10	0.26	7.0	182	
11	0,26	9.0	183	
12	0.30	2.0	183	
13	0.35	Ø		
14	0.38	1.0	183	
15	0.42	1.5	183	
16	0.40	3.0	183	
17	0.40	2.0	183	
18	0.36	Ø	183	
19	0.34	Ø	183	
20	0.34	1.0	183	
21	0.30	2.0	182	
22	0.30	5.0	182	
23	0.28	5.0	182	
24	0.26	6.0	182	
Average	#DIV/0!	#DIV/0!	#DIV/0!	

PITOT LEAK CHECK (> 3")			
INITIAL (+) (-) (-)			
FINAL	(+) 1	(-) 🗸	



NOTES: _____

Appendix C

Method 5 / 12
Particulate Matter &
Inorganic Lead
Calculations

Furnace # 2



SUMMARY OF RESULTS

Project Name:	Battery Recycling Corp.
Project Number:	39400681.00001
Site Location:	Furnace 2
Test Location:	Baghouse Inlet Duct

Parameters	Run - 1	Run - 2	Run - 3	Average
Run Times	13:16 - 21:34	8:19 - 18:22	9:47 - 18:10	
Date	7/31/2012	8/1/2012	8/2/2012	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	79.640	80.326	75.730	78.565
Moisture Content (% Vol.)	4.4	4.8	5.0	4.7
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (°F)	178.5	175.4	177.9	177
Stack Velocity (ft/min.)	2,440	2,470	2,467	2,459
Gas Flow Rate (ACFM)	44,765	45,311	45,271	45,116
Gas Flow Rate (SCFM)	35,811	36,612	36,318	36,247
Gas Flow Rate (DSCFM)	34,237	34,863	34,487	34,529
Percent Isokinetic	104.3	103.3	98.5	102.1
Particulate Conc. (Grains/DSCF)	0.0064	0.0043	0.0049	0.0052
Particulate Conc. (MG/DSCM)	14.720	9.934	11.283	11.979
Particulate Mass Rate (pounds/hr)	1.888	1.297	1.458	1.548
Lead Conc. (Grains/DSCF)	0.000018	0.000018	0.000012	0.000016
Lead Mass Rate (pounds/hour)	0.0053	0.0053	0.0035	0.0047

STACK TEST CALCULATIONS

Part. Weight:

0.0332

,g

29.91 Calculated **BRC** Barom. Psr.: Project: Static Psr.: -13.1 Ps: 28.947 Project No: Source: Furnace - 2 18.348 1.8497 As: Delta H @: 0.000341 0.9533 An: 1 Gamma: Run No.: 7/31/2012 0.836 Pitot Coef.: Date: 58 87.65 Stack Dia.: Sample Volume: 0.25 120 Nozzle Dia.: in. Sample Time: 77.8 20 H2O Gain: ,ml O2 Conc.:

1

CO2 Conc.:

TRAVERSE POINT NUMBER	VELOCITY DELTA P Actual Sq. Root		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.38	0.616441	1.25	98	176
2	0.40	0.632456	1.30	100	178
3	0.52	0.72111	1.72	102	180
4	0.49	0.7	1.62	103	181
5	0.48	0.69282	1.60	104	182
6	0.43	0.655744	1.45	105	181
7	0.34	0.583095	1.12	106	181
8	0.46	0.678233	1.60	103	169
9	0.46	0.678233	1.60	103	169
10	0.46	0.678233	1.60	102	162
11	0.38	0.616441	1.30	102	170
12	0.44	0.663325	1.65	102	168
13	0.45	0.67082	1.60	87	178
14	0.41	0.640312	1.42	87	175
15	0.42	0.648074	1.48	87	180
16	0.43	0.655744	1.50	87	183
17	0.40	0.632456	1.40	87	185
18	0.40	0.632456	1.40	88	186
19	0.35	0.591608	1.25	88	187
20	0.25	0.5	0.88	90	184
21	0.46	0.678233	1.60	90	185
22	0.50	0.707107	1.75	90	183
23	0.35	0.591608	1.25	91	182
24	0.46	0.678233	1.60	91	180
AVERAGE	0.4216667	0.647616	1.4558333	95.54166667	178.54167

Project: BRC

Project No: 0 Source: Furnace - 2

Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 3.66 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 79.640 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.04

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO + %N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo))

Ms = 28.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 2.439.8 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 44,764.99 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 35,811.43 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 34,237.12 DSCFM

Vsstd = Qstd/As

Vsstd = 1866.01 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

is = 1.04

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0064

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.89

STACK TEST CALCULATIONS

BRC Project: 0 Project No: Source: Furnace - 2 2 Run No.: 8/1/2012 Date: 88.935 Sample Volume: 120 Sample Time: 20 O2 Conc.: 1 CO2 Conc.:

 Barom. Psr.:
 29.94
 Calculated

 Static Psr.:
 -11.5
 Ps: 29.094

 Delta H @:
 1.8497
 As: 18.348

 Gamma:
 0.9533
 An: 0.000341

 Pitot Coef.:
 0.836

 Pitot Coef.:
 0.836

 Stack Dia.:
 58
 ,in.

 Nozzle Dia.:
 0.25
 ,in.

 H2O Gain:
 85.6
 ,ml

 Part. Weight:
 0.0226
 ,g

TRAVERSE POINT NUMBER	VELO DELT Actual		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.40	0.632456	1.42	84	174
2	0.46	0.678233	1.62	85	175
3	0.49	0.7	1.75	87	176
4	0.49	0.7	1.75	89	178
5	0.47	0.685565	1.68	99	174
6	0.48	0.69282	1.70	101	179
7	0.42	0.648074	1.50	101	181
8	0.43	0.655744	1.52	102	179
9	0.43	0.655744	1.52	103	180
10	0.43	0.655744	1.52	104	179
11	0.47	0.685565	1.68	105	184
12	0.42	0.648074	1.50	106	183
13	0.42	0.648074	1.50	106	166
14	0.37	0.608276	1.28	106	169
15	0.42	0.648074	1.50	106	168
16	0.49	0.7	1.75	106	171
17	0.47	0.685565	1.65	107	174
18	0.43	0.655744	1.52	107	177
19	0.37	0.608276	1.28	96	181
20	0.42	0.648074	1.50	97	180
21	0.44	0.663325	1.55	97	181
22	0.42	0.648074	1.50	98	180
23	0.36	0.6	1.25	98	181
24	0.42	0.648074	1.50	99	140
AVERAGE	0.4341667	0.658316	1.5391667	99.54166667	175.4167

Project: BRC

Project No:

Source: Furnace - 2 Run No.: 2

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 4.03 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 80.326 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.05

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO + %N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo))

Ms = 28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 2,469.6 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 45,310.88 ACFM

 $Qs = Qa \times 528/Ts \times Ps/29.92$

Qs = 36,612.20 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 34,863.44 DSCFM

Vsstd = Qstd/As

Vsstd = 1900.15 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 1.03

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0043

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.30

STACK TEST CALCULATIONS

BRC 29.97 Project: Barom. Psr.: Calculated -13.2 28.999 0 Static Psr.: Ps: Project No: Source: Furnace - 2 1.8497 As: 18.348 Delta H @: An: 0.000341 3 0.9533 Run No.: Gamma: 8/2/2012 0.836 Pitot Coef.: Date: 86.300 Stack Dia.: 58 in. Sample Volume: 120 0.25 Nozzle Dia.: in. Sample Time: 85.4 O2 Conc.: 20 H2O Gain: ,ml 1 Part. Weight: 0.0242 CO2 Conc.: ,g

TRAVERSE POINT NUMBER	VELO DELT Actual		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.52	0.72111	1.82	96	183
2	0.54	0.734847	1.90	97	186
3	0.63	0.793725	2.10	97	186
4	0.56	0.748331	1.95	98	188
5	0.50	0.707107	1.75	99	187
6	0.45	0.67082	1.55	99	188
7	0.38	0.616441	1.32	114	161
8	0.35	0.591608	1.22	115	165
9	0.35	0.591608	1.22	116	168
10	0.33	0.574456	1.15	116	169
11	0.26	0.509902	0.90	118	167
12	0.20	0.447214	0.70	118	165
13	0.41	0.640312	1.45	124	170
14	0.46	0.678233	1.60	124	169
15	0.53	0.728011	1.85	125	172
16	0.52	0.72111	1.80	125	182
17	0.52	0.72111	1.80	125	198
18	0.45	0.67082	1.55	127	179
19	0.42	0.648074	1.45	127	186
20	0.38	0.616441	1.32	127	183
21	0.45	0.67082	1.55	127	181
22	0.30	0.547723	1.05	127	181
23	0.47	0.685565	1.65	127	178
24	0.47	0.685565	1.65	127	178
AVERAGE	0.4354167	0.65504	1.5125	116.4583333	177.9167

Project: BRC

Project No:

Source: Furnace - 2 Run No.: 3

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd =

4.02 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd =

75.730 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo =

0.05

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO + %N2)

Md =

29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo))

Ms =

28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs =

2,467.4 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa=

45,271.05 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs =

36,317.68 SCFM

Qstd = Qs(1 - Bwo)

Qstd =

34,487.09 DSCFM

Vsstd = Qstd/As

Vsstd =

1879.63 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

ls =

0.98

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs =

0.0049

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr =

1.46



TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681	
SOURCE:	Furnace 2	TEST DATE:	7/31/2012	
TRAIN I.D.	1	TEST NO.:	1	
COLLECTED BY:	MSM	CHKD BY:		
	MSM			_

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	783.0	831.8	48.8
2	709.6	720.3	10.7
3	602.2	604.7	2.5
4	849.2	865.0	15.8
5			0.0
6			0.0
7			0.0
TOTAL	2944.0	3021.8	77.8

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	49.9050	49.9378	0.0328
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0328
FILTER # 1	0.3483	0.3487	0.0004
FILTER # 2			0.0000
IMPINGERS			0.0000

^{*} subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0332
COMMENTS:	



TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681	
SOURCE:	Furnace 2	TEST DATE:	8/1/2012	
TRAIN I.D.	2	TEST NO.:	2	
COLLECTED BY:	MSM	CHKD BY:		

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	774.5	833.0	58.5
2	736.5	743.7	7.2
3	612.7	616.6	3.9
4	840.5	856.5	16.0
5			0.0
6			0.0
7			0.0
TOTAL	2964.2	3049.8	85.6

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	50.8684	50.8908	0.0224
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0224
FILTER # 1	0.3478	0.3480	0.0002
FILTER # 2			0.0000
IMPINGERS			0.0000

^{*} subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0226
OMMENTS:	



TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 3	TEST DATE:	8/2/2012
TRAIN I.D.	5	TEST NO.:	3
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	743.3	796.7	53.4
2	732.0	738.0	6.0
3	605.1	616.6	11.5
4	897.2	911.7	14.5
5			0.0
6			0.0
7			0.0
TOTAL	2977.6	3063.0	85.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	49.7704	49.7944	0.0240
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0240
FILTER # 1	0.3587	0.3589	0.0002
FILTER # 2			0.0000
IMPINGERS			0.0000

^{*} subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0242
COMMENTS:	

Project:

Battery Recycling Company

Project No.: Date: 39400681 August 2, 2012

Lead Mass Emission Calculations

INPUT PARAMETERS

Lead	Total ug	grams/sample	Vmstd	Qstd	Mass Rate (lbs/hr)	Lead Concentration (grains/dscf)	Lead Concentration (mg/dscm)
Run 1	92.6	0.0000926	79.640	34,237	0.0053	0.0000179	0.0411
Run 2	92.9	0.0000929	80.326	34,863	0.0053	0.0000178	0.0408
Run 3	58.9	0.0000589	75.730	34,487	0.0035	0.0000120	0.0275
			Ave	rage	0.0047	0.0000159	0.0365
					Compliance Limit		2.0
					Tons/year	0.0206548	

Lead Mass Rate (lb/hr)

Lead Mass Rate (Tons/year)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

mass rate (Tons/year) = mass rate(lbs/hr) * 24(hrs) * 365(days) / 2000(lbs/ton)

Mn= grams/sample

Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)



Pre-Test / Cyclonic Flow Data Sheet

Project Name: _	Battery Recycling Co.	Test No.:	Pre Test	Stack Dimensions:58"	
Project No.: _	39400681.00001	Location:	Furnace # 2	Barometric Pressure:	in. Hg
Date:	7/30/2012	Personnel:	MM,TG,RR	Static Pressure:6.4	in. H₂O

Test Time : Start : 17:10 Stop : 17:23

Pre-T	raverse / Cyc	lonic Flow (Check
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp
1	0.4	0.0	184
2	0.39	0.0	184
3	0.4	4.0	184
4	0.42	3.0	183
5	0.38	9.0	183
6	0.38	7.0	183
7	0.33	7.0	183
8	0.31	5.0	183
9	0.3	5.2	181
10	0.31	6.8	182
11	0.28	8.3	182
12	0.32	7.4	181
13	0.42	1.0	183
14	0.41	0.0	183
15	0.41	1.0	184
16	0.39	1.2	184
17	0.35	2.0	185
18	0.34	3.0	185
19	0.34	3.8	185
20	0.32	7.7	185
21	0.3	9.1	183
22	0.27	6.2	183
23	0.27	7.1	180
24	0.25	5.0	181
Average	0.35	4.58	183

PITO	T LEAK CHECK	(> 3")
INITIAL	(+)	(-)
FINAL	(+)	(-)

NOTES:		
-		

Method 5 / 12
Particulate Matter &
Inorganic Lead
Field Data Sheets

Furnace # 2



Sample Box No.:

Probe Heater Setting:

Personnel: MM TG

STACK TEST DATA SHEET

Probe Liner:

Project:	Battery Recycling Co.
Project No:	39400681.00001
Source:	Furnace # 2 Duct
Run No.:	i
Date:	7-31-12
Filter No.:	
Meter Box I.D.:	5

250

RR

Barom. Psr.: 29.91

Static Psr.: 1, 3497

Gamma: 0, 9533

Pitot Coef.: 58"

Stack Dia.: 58"

Stack Area: Port Length: 3.0"

Port Dia.: 3"

Glass

Schematic of Stack

TRAVERSE POINT NUMBER	SAMPLI TIME Clock		VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	13:16	0.0	0.38	1.25	917.215	98	255	250	176	66	3
2		5.0	0.40	1,30	920.30	100	255	247	178	61	3
3		10.0	0.52	1.72	923,70	102	253	250	180	62	5
4		15.0	0.49	1.62	927.50	103	256	249	181	61	5
5		20.0	0.48	1.60	931.00	104	253	251	182	61	5
4		25.0	0.43	1.45	935.10	105	254	247	181	57	5
7		30.0	0.34	1.12	938.80	106	255	249	181	55	4
80	13:51/15:08	35.0	0.46	1,60	942.30	103	255	251	169	55	4
9		40.0	0.46	1.60	946.10	103	254	253	169	51	4
10		45.0	0.46	1.60	949.40	102	254	251	162	53	4
11		50.0	0.38	1.30	953, 20	102	254	251	170	54	3
12		55.0	0.44	1.65	956.70	102	254	248	108	55	4
13	15:33/20:34	1.00	0.45	1,60	960.20/960.820	87	245	260	178	62	5
2		1.05	0.41	1.42	966.60	87	247	252	175	59	4
3		1.10	0,42	1.48	969.20	87	246	250	180	61	4
4		1.15	0.43	1.50	972.80	87	246	256	183	57	4
5		1.20	0,40	1.40	975.90	37	247	255	185	53	4
6		1.25	0.40	1.40	979.70	88	245	250	186	51	4
7		1.30	0.35	1,25	983.60	88	245	255	187	49	4
8		1.35	0.25	0.88	987.20	90	245	250	184	50	3
9		1.40	0.46	1.60	989.70	90	246	250	185	51	5
10		1.45	0,50	1.75	993,60	90	246	261	183	50	5
11		1.50	0.35	1.25	997.50	91	245	253	_	51	5
12		1.55	0.46	1.00	1001.00	91	245	252	180	51	4
	21:34	2.00			1004.865						
		2									
AVERAGE	-				87.65						

LEAK CHECKS	
Pitot impact:	V
Pitot static:	/
Train initial: 0.06/5	0.0@10
Train Final: 0.0010	. 74

NOZZLE ME	ASUREMENT	
I.D. No.:	2	
1	0.250	
2	0.250	
3	0.250	
Avg.	0.250	

	STACK GA	S ANALYSIS	
	CO2	O2	co
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: Wend of charge Gend of Ihr during charge

Oncertor Cignotures	Page:	1	of	0 /	
Operator Signature:	3 100				



M5/M12 TEST LAB DATA SHEET

PROJECT:	Battery Recycling	JOB NO.:	39400681.00001
	Furnace # 2 Duct	DATE: _	1-31-12
TRAIN I.D.:	2	TEST NO.:	
COLLECTED BY:	MSM	CHKD. BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	783.0	831.8	43.2
2	709.6	720.3	6.3
3	602.2	604.7	4.3
4	849.2	865.0	16.6
5			
6			
7			04
TOTAL	2930.5	3050,9	70.4

PARTICULATE

	INDICATION AND	FINIAL VA/T &	NET WT., g
SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	
PROBE WASH	49.9050	49,9378	0.0328
REAGENT BLANK			
CORRECTED PROBE \	NASH*	•	
#1 FILTER	0.3483	0.3487	0.0004
#2 FILTER			
IMPINGERS			
PARTICULATE COLLE	CTED		

^{*}subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g



STACK TEST DATA SHEET

 Project:
 Battery Recycling Co.

 Project No:
 39400681.00001

 Source:
 Furnace # 2 Duct

 Run No.:
 2

 Date:
 8 - 1 - 12

Date: 8-1-12

Filter No.: 61176

Meter Box I.D.: 5

Sample Box No.: 4

Probe Heater Setting: 250
Personnel: MM TG KR

Barom. Psr.: 29.94

Static Psr.: -11.5

Delta H @: 1.8497

Gamma: 0.9533

Pitot Coef.: Stack Dia.:

58" ******

Stack Area:

Port Length: 3.0"

Port Dia.: 3"

Probe Liner: Glass

Schematic of Stack

Probe 18. Pitot 18: PT-9

TRAVERSE POINT NUMBER	SAMPLIN TIME Clock	NG Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
i	8:19	0.0	0.40	1.42	5.100	84	247	264	\$ 174	64	5
2	-	5.0	0.46	1.62	9.10	85	246	250	175	59	5
3		10.0	0.49	1.75	13.20	87	246	245	176	60	5
4		15.0	0.49	1.75	16.80	89	245	248	178	60	5
5	08:39/10:46	20.0	0.47	1.68	20,335	99	247	254	174	64	5
6	0011010	25.0	0.48	1.70	23.40	101	244	242	179	49	5_
1		30.0	0.42	1.50	28.20	101	247	250	181	50	5
8		35.0	0,43	1,52	31.80	102	246	247	179	52	5
9		40.0	0.43	1.52	35.00	103	246	245	180	52	5
10		45.0	0.43	1,52	39.10	104	247	241	179	52	5
11		50.0	0.47	1.68	42.50	105	246	242	184	52	5
12		55.0	0.42	1.50	46.30	106	247	243	183	53	5
1 3	11:26/13:13	1.00	0.42	1.50	50.415/50.785	100	247	258	100	62	5
2		1.05	0,37	1.28	54.20	106	249	260	169	54	5
3		1.10	0.42	1.50	57.80	100	247	261	168	50	5
4		1.15	0,49	1.75	70.00	106	247	246	171	58	0
5		1.20	0.47	1.05	65.00	107	243	237	174	59	6
6		1.25	0.43	1.52	69.00	107	244	264	177	60	6
7 3	13:43/17:52	1.30	0.37	1.28	72.670	96	246	251	181	63	4
8	- Z	1.35	0.42	1.50	76.00	97	248	254	180	49	5
9		1.40	0.44	1,55	79.60	97	246	249	181	51	5
10		1.45	0.42	1.50	83.20	98	247	259	180	52	5
11		1.50	0.36	1.25	96.70	98	245	250	181	53	5
12		1.55	0.42	1.50	90.80	99	244	264	140	53	5
	18:22	2.00			94.035				-		
		2008									-
AVERAGE					88.935					<u> </u>	

LEAK CHECKS	3
Pitot impact:	1 1
Pitot static:	
Train initial: 0.0615	0.0015
Train Final: 0.0@15	0,0010"

NOZZLE ME	EASUREMENT
I.D. No.:	
1	.250
2	250
3	,250
Avg.	.250

	STACK GA	SANALYSIS	
	CO2	O2	CO
1 l.	200	20,0	
2 1.	1000	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: Dend charging Bend of port A Dend charge #3 Tapping

Page:

of 4



M5/M12 TEST LAB DATA SHEET

PROJECT:	Battery Recycling	JOB NO.:	39400681.00001
	Furnace # 2 Duct	DATE:	8-1-12
TRAIN I.D.:	4	TEST NO.:	2
COLLECTED BY:	Msm	CHKD. BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	774.5	833.6	58.5
2	734.5	743,7	7.2
3	612.7	Le 1 6. Ve	3.9
4	340.5	856.5	16.0
5			
6			
7			
TOTAL	2964,2	3049.8	85.6

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	50.8684	50.8908	0.0224
REAGENT BLANK			
CORRECTED PROBE	WASH*		
#1 FILTER	0.3478	0.3480	0.0002
#2 FILTER			
IMPINGERS			
PARTICULATE COLLE	CTED		

^{*}subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g



Probe Heater Setting:

Personnel:

STACK TEST DATA SHEET

Port Dia.:

Probe Liner:

29.97 Barom. Psr.: Battery Recycling Co. Project: -13.2 Static Psr.: 39400681.00001 Project No: 1.8497 Delta H @: Furnace # 2 Duct Source: 0,9533 Gamma: Run No.: 8-2-12 Pitot Coef.: Date: 00 G1204 Stack Dia.: Filter No.: Stack Area: Meter Box I.D.: 6 3.0" Port Length: Sample Box No.:

250

MM TG RIZ

Schematic of Stack

TRAVERSE POINT NUMBER	SAMPLIN TIME Clock	NG Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
NOWBER	9:47	0.0	0.52	1.82	94.220	96	246	243	183	49	5
2		5.0	0.54	1.90	97.90	97	246	242	186	47	5
3		10.0	0.63	2.10	102.00	97	247	242	186	50	6
4		15.0	0.56	1.95	106.20	98	247	241	188	55	5
5		20.0	0.50	1.75	110.80	99	244	249	187	57	5
6		25.0	0.45	1.55	115.10	99	246	247	188	57	5
7	10:17/16:16	30.0	0.38	1.32	118.260/118.450	114	245	241	161	48	6
8	10-11/16-16	35.0	0.35	1.22	122.20	115	245	250	165	48	6
9		40.0	0.35	1.22	124.90	116	246	249	168	48	0
10		45.0	0,33	1.15	128.10	116	247	247	169	48	6
11		50.0	0.26	0.90	130.30	118	246	248	167	52	5
12	. 3)	55.0	0.20	0,70	133.70	118	245	248	105	52	5
1	16:46/17:10	1.00	0.41	1.45	136.48/136.60	124	245	247	170	55	7
2	10 19 1110	1.05	0.46	1.00	140.20	124	246	245	169	50	7
3		1.10	0.53	1.35	143,90	125	247	250	172	52	7
4		1.15	0,52	1.80	147.40	125	248	247	182	52	7
5		1.20	0.52	1.80	152.00	125	249	250	198	52	7
6		1.25	0.45	1.55	156.30	127	248	249	179	52	7
7		1.30	0.42	1.45	158,90	127	247	249	186	53	7
8		1.35	0.38	1.32	102.80	127	243	253	183	53	7
9		1.40	0,45	1.55	166.10	127	248	247	181	53	7
10		1.45	0.30	1.05	170.00	127	246	246	181	53	7
11		1.50	0.47	1.65	173.10	127	246		178	53	7
12		1.55	0.47	1.65	177.20	127	248	254	118	54	7
12	18:10	2.00			180.520						
	10.10	2.00									
AVERAGE		g.co									

3"

Glass

LEAK CHECKS	8
Pitot impact:	
Pitot static:	/
Train initial: 0.0815	0,0010"
Train Final: 0.0 @ 15"	0.0 810"

NOZZLE ME	ASUREMENT	
1.D. No.:		
1	.250	
2	,250	
3	.250	
Avg.	.250	

_	STACK CA	SANALYSIS	
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: O Charge 1 @ tapping

& charge

Operator Signature:

Page: 1 of \$



M5/M12 TEST LAB DATA SHEET

PROJECT:	Battery Recycling	JOB NO.:	39400681.00001
SOURCE:	Furnace # 2 Duct	DATE: [8-2-12
TRAIN I.D.:	6	TEST NO.:	3
COLLECTED BY:	MsM	CHKD. BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	743.3	796.7	53.4
2	732,0	738.0	6.0
3	605.1	416.6	11.5
4	897.2	911.7	14.5
5			
6			
7			
TOTAL	2977.6	3063.0	85.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	49.7704	49.7944	6.0240
REAGENT BLANK			
CORRECTED PROBE	WASH*		
#1 FILTER 6/204	0,3587	0.3589	0.0002
#2 FILTER			
IMPINGERS			
PARTICULATE COLLE	CTED		

^{*}subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

Pre-Test / Cyclonic Flow Data Sheet

Project Name: Battery Recycling Co. Project No.: 39400681.00001

Test No.: Pre-+cs+ Stack Dimensions: 60"

Location: Furnace #2 Barometric Pressure: in. Hg Personnel: MM TG RR

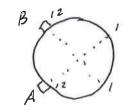
Static Pressure: ____6.4___in. H₂O

Test Time:

Start : 17:10 Stop : 17:23

Pre-T	raverse / Cyc	lonic Flow C	heck
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp
1	0.40	Ø	134
2	0.39	Ø	184
3	0.40	4.0	134
4	0.42	3.0	183
5	0.38	9.0	183
6	0.38	7.0	183
7	0.33	7.0	183
8	0.31	5.0	183
9	0.30	5.2	181
10	0.31	6.8	182
11	0.28	8.3	182
12	0.32	7.4	181
13	0.42	1	183
14	0.41	Ø	183
15	0.41	1.0	184
16	0.39	1,2	184
17	0.35	2.0	185
18	0.34	3.0	185
19	0.34	3.8	185
20	0.32	7.7	135
21	0.30	9.1	183
22	0.27	6.2	183
23	0.27	7.1	180
24	0.25	5.0	181
Average	#DIV/0!	#DIV/0!	#DIV/0!

PITO	PITOT LEAK CHECK (> 3")				
INITIAL	(+)	(-) 🗸			
FINAL	(+) 🗸	(·) V			





Visible Emissions Opacity

VISIBLE EMISSION OBSERVATION FORM Run 12 Company Name Observation Date Start Time End Time 0820 Location Min 15 30 45 Comments Zip 15th charge 0 Arecibo Process Equipment Recencing Operating Mode house Hormat 3 Control Equipment Operating Mode 4 0 0 0 norma Describe Emission Point 0 80' ta Cisculas 6 7 0 **Height of Emission Point** Height Relative to Observer 80' End Same 0 Distance to Emission Point Direction to Emission Point 9 Star MBW End Some Start 240' End Somp 10 Vertical Angle to Observation Pt. Start 30° End Direction to Observation Point Start PNE End 11 Samo Describe Emissions 12 0 Start Clear Emissions some End **Emission Color** If Water Droplet Plume (Circle) 14 Start A End Some Attached D
Point In The Plume At Which Opacity Was Determined Detached (NIA 15 0 16 0 Start 10' above stack Son End 17 0 Describe Plume Background blue Start blue Sku End Mostly 18 0 Sky Condition Sunry Background Color 19 0 0 Blue & Start blue End dak ga Stort 104/0 0 Wind Speed Wind Direction 21 0 Start 🔿 End () - 5 Start MA End SE RH Percent Ambient Temp Wet Bulb 0 1 23 Start 89 F End Same 24 25 SOURCE LAYOUT SKETCH 0 EMISSION 26 OBSERVATION POINT 27 0 0 0 28 0 29 0 0 0 STACK WITH NORTH ARROW SUN Observer's Name (Print) OBSERVER'S POSITION WIND Observer's Signature Date 8-1-12 SUN LOCATION LINE Organization URS Certified by Date 9-12 Additional Information & Associates Carl Continue on reverse side

Sec	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	8	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	Ŏ	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
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58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Additional Information	-	

(: :

VISIBLE EMISSION OBSERVATION FORM

Continue Color C	Company Name Battery Recycling Co			Observation Date Start Time End Time			Time End Time		
Series Color Serie	Main Sto	role)	7	Sec					
Regent of Emission Point Bescribe Emission Point Sort 240 Bescribe Emission Point	City \	State P	Zip	1	0	0	0	0	
Describe Emission Point Height of Emission Point Sort All Curculer Stock Bright Relative to Observer Sort O C C Sind Tyl End Some Birth Sort South Stock Sort July Emission Point Bright of Emission Point Sort All Curculer Stock Sort Tyl End Some Direction to Emission Point Sort All Curculer Stock Sort July Emission Point Sort July Emission Point Direction to Emission Point Sort July Emissio	Process Equipment	malter	Operating Mode	2	0	0	0	0	
Bescribe Emission Point Height Relative to Observer Sort The End The End Sort The End	Control Equipment		Operating Mode	3	0	0	0	0	
Height of Emission Point Height Relative to Observer Sour Tyl End End Sour Tyl End Sour Tyl End End End Sour Tyl End End End End Sour Tyl End End End End Sour Tyl End E	Describe Emission Point	N N N		-	0	0	0	0	
Height of Emission Point Sourt 7-6 End Section	80' ta	11 Circul	iar Stack		0		0	0	
Distance to Emission Point Start 74				_	9		0		
Distance to Emission Point Surt 2 O End Sury Start Share End Sure Surt 2 O End Sure Start Share End Sure Surt 2 O End Sure Start Share End Sure Surt 2 O End Sure Start Share End Sure Surt 2 O End Sure Start Share End Sure Emission Color Surt 2 C e End Sure Surt 2 C e End Sure Surt 2 C e End Sure Surt 3 Sure Share End Sure Surt 4 C e Sure Surt 4 C e Sure Surt 5 Sure Share Sure Surt 6 Sure Sure Sure Sure Share Sure				-	<i>€</i>		0		
Start 240				-	0	0	0		
Describe Emissions Start Close End Start Describe Plume (Circle)						0	0	0	
Describe Emissions Start Clear Emission Start Clear End Son Attached Detached Start Clear End Son Attached Detached Start Clear End Son Attached Detached Start Clear End Son Start Clear		Direction to Observati	on Point				0	0	
13	Describe Emissions	NINE NINE	End Same	\vdash	_		0	_	
Emission Color Start Cless End Som Attached Detached Attached Detached Detached From Start Cless End Som Start Level End Som Start Cless End Som	Start clear Emission	End Sam	0	13					
Point In The Plume At Which Opacity Was Determined Start Of From Stark Regular Describe Plume Background Start Of Stark Regular Start Of Stark Regular Background Color— Start Observer Start Clean End Sun Wind Speed Wind Direction Start Observer Start Clean End Sun Ambient Temp Start Observer Start Regular Start Start Regular Web Bulb Temp RH Percent SOURCE LAYOUT SKETCH EMISSION OBSERVER'S POSITION DRAW WITH PLUSS STACK WIND OBSERVER'S POSITION Observer's Signature Observer's Name (Print)	Emission Color	If Water Droplet		14	0		0		
Describe Plume Background Start Blue Skeet Clouds End Start Blue Skeet Clouds End Start Blue Skeet Clouds End Start Clouds En	Point In The Plume At Which Operit		etached NA	15			O	0	
Start				16	0	0	0	0	
Start Discrete End School Start Clotted End School Start End School School School School School School Start End School Sc	Describe Plume Background	GT		17	0	0	0		i.
Start Discrete End School Start Clotted End School Start End School School School School School School Start End School Sc	Start Blue Sky? Clouds		une	18	0	0	0	0	
Start 0 5 End Start Star	Background Color -3	Sky Condition Mostly		19	0	-	0	0	
Start 0 5 End	Wind Speed	Wind Direction			0	0	0	0	
Ambient Temp Start 05° F End 90° F End 90° F SOURCE LAYOUT SKETCH EMISSION OISSRAATION POINT 27 0 0 0 28 0 0 0 29 0 0 0 29 0 0 0 Deaw NORTH ARROW SIN			1		0	0	0	0	
SOURCE LAYOUT SKETCH EMISSION OBSERVATION POINT STACK WITH PLUME PLUME SIN WIND OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S SIGnature Observer's Name (Print) Observer's Name (Print) Observer's Signature Organization Certified by Certified by Oate 4-9-12	Ambient Temp	Wet Bulb			0	0	0	\bigcirc	
SOURCE LAYOUT SKETCH EMISSION OBSERVATION POINT STACK WITH PLUME SEX WIND OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S SIGNature Observer's Name (Print) Component Observer's Signature Organization Certified by October Component Observer's Signature Organization Observer's Signature Observer's Sig	Start 85° F End 90° F	remp			$\frac{\mathcal{O}}{\mathcal{O}}$	읽	9	9	
STACK WITH PLUME SIN DRAW NORTHAROW SIN DOBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S POSITION OBSERVER'S SIGNATURE OF CONTROL OF CErtified by Certified by Certified by Certified by Control of Control of Certified by	SOUDCELAVO	MIT SIZETON		1000		4	2		
STACK WITH PLUME NORTHARROW SUN DRAW NORTHARROW SUN DOBSERVER'S POSITION Observer's Name (Print) Observer's Signature Observer's Signature Occurrence Occurrence Occurrence Certified by Occurrence Certified by Occurrence Additional Information Date Start Certified by Occurrence Certified by Occurrence Occurrence Certified by Occurrence Occurrence Certified by Occurrence Occu	EMISS	ION						3	
STACK WITH PLUME SUN DESERVER'S POSITION Observer's Name (Print) Observer's Signature Observer's Signature Observer's Signature October Standard Office									
STACK WITH PLUME SUN DESERVER'S POSITION OBSERVER'S POSITION Observer's Name (Print) Observer's Signature Observer's Signature Organization Certified by Certified by Occupants Date 8-2-12 Organization Certified by Occupants Date 4-9-12	FSE T	4					2		
Observer's Name (Print) Observer's Signature Observer's Signature Observer's Signature Occupation Certified by Certified by Occupation Date Occupation Date Occupation Certified by Occupation Occup	STACK	1			_				
Observer's Name (Print) Observer's Signature Observer's Signature Observer's Signature Organization Organization Certified by Certified by Observer's Name (Print) Date 8-2-12 Organization Certified by Observer's Name (Print) Date 8-2-12				30	0	0		0	
Observer's Signature Observer's Signature Observer's Signature Organization Organization Certified by Carporation Certified by Carporation Date 4-9-12	SUN	•		Obsorra	-20 Nas	(D-:			
Observer's Signature Observer's Signature Observer's Signature Occupation	WIND OBSERVER'S POSITION			RE	36	A 3	_		and
Startsunitection Line Starp Organization Organization Organization Certified by Car Kookt Z & Associates 4-9-12	140.						- - 1 - 1,	B	Date
Additional Information Stop Certified by Car Kookt z & Associates 4-9-12	SUNLOCATION LINE			Organiza	rtion	18	_	2	18-2-12
Additional Information Certified by Cas Kooktz & Associates 4-9-12	Statis				5	Cor	par	which	on .
	Additional Information	3.70			by <		1	٤٨	Date
				Continue	on rev	erse si	lde		

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33 34 35 36 37 38 (39 40 841	000000000000000000000000000000000000000	000000000	0 0 0 0 0 0	000000000000000000000000000000000000000	Start 11.02am
34 35 36 37 38 (39 40 41		00000000	0 0 0 0 0 0		Start 11.02am
35 36 37 38 (39 40 41 (41		0000000	000000	0 0 0 0 0 0	Start 11.02am
36 / 37 (38 / 39 (40) 41 (000000	000	0 0 0	Start 11.02am
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58	2	0	0	0	
	9	0	0	0	, , , , , , , , , , , , , , , , , , ,
	2	0	0	0	Stop

Additional Information	

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VISIBLE EMISSION OBSERVATION FORM

Company Name Battery Recycling Co.			Observa	tion D	ate 7-31	-12	Start T	ime End Time
Location Stack (mo		3	Sec	0	15	30	45	Comments
City	State Pico	Zip	1	0	U	0	0	Comments
Process Equipment	,	Operating Mode	2	0	0	0	Ò	
Control Engipment	er	Operating Motte	3	0	0	8	0	
15mg house		Nevmal	4	ئ	0	0	0	
Describe Emission Point	rlar sta	ick	5	0	0	0	0	
(Tall)			6	0	0	0	0	
Height of Emission Point	Height Relative t	Observer	7	0	0	0	0	
80"	Start 74.5'	End Scare	8	0	0	0	0	
Distance to Emission Point	Direction to Emis	sion Point	9	0	0	0	0	
Start 240' End Same	Start ANE		10	0	0	0	0	
Vertical Angle to Observation Pt. Start 45 End Same	Directionate Observation	n Point End	11	0	0	0	0	
Describe Emissions			12	0	0	0	0	
Start Clear Englissions	End Sw	e	13	0	0	0	0	
Emission Color	If Water Droplet	Plume (Circle)	14	0	0	0	0	
Start NA End Send		etached N/A	15	0	0	0	0	
Point In The Plume At Which Opacity	Was Determined		16	0	0	5	0	
Start 10' INW of Exit Describe Plume Background			17	0	0		Ö	,
Start D YET Cast Gray	ky	1 Gray	18	0	0	0	0	(8)
Background Color	Sky Condition	25t Own	19	20		-		
Start Gray End Dorkorm		End C		0	0	_	0	
Wind Speed	Wind Direction	Some	21		_			
Start 0 3 End 6 5	Start ESE	End Suns			0	9	0	
Ambient Temp	Wet Bulb	RH Percent	-	0	0	9	0	
Start 85 F End Cane	Temp		23	2	0	2	0	
9.0 Y Y G D Y					2	2	0	
SOURCE LAYO						2	힞	
OBSERV	ATION	Wind ESE				0	0	
X	λ =	whind est	27		_		0	
1	/	Start	28	0	0	0	0	
STACK WITH	9	DRAW	29		0	0	0	
PLUME		NORTHARROW	30	00	2	0	0	
SUN -	-	(N)	Observe	r's Nan	ne (Pri	nt)		
WIND OBSERVER'S POSITION					She		7	Ra-mond
140			Observe	Sign	ature		_	Date
SUNDCATION LINE			\sim	1	D	\geq \langle	0	7.31.12
soc open	ION DEVE	11	Organiza	CZ	Z	m	7	1550c jates
Additional Information			Certified		, KS	(~ /	Data
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32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	24
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0		
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Additional Information			
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Appendix E

THERMOCOUPLE READOUT CALIBRATION DATA FORM (FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readour	Number: urs 001	Calibrated By	: R.Raymond
Ambient Temperature:	70	F Date:	6/28/2012
Omega Engineering Calibrator	Model No. 22 TC	Serial #'s	174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference ^a Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	1	0.22
200	201	0.15
400	397	0.35
600	600	0.00
1000	1001	0.07
1200	1199	0.06

Are all the Thermocouple Readout calibration points within calibration standard of <= to 1.5 %?

Yes

* 100 <= 1.5 %

-	Ref. Temp.,	oF + 460	* 100 <=
Calibrator Signature:	Robert Raymond	Date:	6/28/2012
Approval Signature:	Toll on	Date:	6/28/2012

(Ref. Temp., oF + 460) - (Test Therm. Temp., oF + 460)



DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs	001	CALIBRATED BY:	R. Raymond	
CALIBRATIO	ON STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69	
CALIBRATION	STANDARD ID:	328963	AMBIENT PRESSURE (In Hg):	29	
DATE	CALIBRATED:	7/19/2012	Secondary Standard Correction Factor		
		GAS VOLUM	E		
Setting (delta H)	Gas Volume Metered (ft3) Secondary Standard	Gas Volume Corrected (ft3) Vw	Gas Votu DGM (ft: Control Cor Vd	3)	
0.5	5	5.090	5.271		
1.0	5	5.090	5.292		
2.0	11	11.198	11,698	AND A COLOR	
3.0	10	10.180	10.635		
4.0	10	10.180	10.620		
-11,-11		TEMPERATU	RE		
Calibrator Temperature (F)			Averag DGM (F) Td	е	
Tw 71.0	-		78,0	Union to Service	
71.0	1		79.0		
71.0			82.0		
72.0	1		83.0		
71.0	1		85.0	Tare to	
71.0	1	CALCULATIO			
	Gamma	Delta			
(min)	(Y)	H@			
13.23	0.9772	1.9352			
9.19	0.9739	1.8640			
14.28	0.9722	1.8495	1		
10.31	0.9696	1.7532			
9.1	0.9740	1.8076			
	Avg Y	Avg Delta H@			
	0.9734	1.8419			
Tolerances	0.9534 0.9934	1.6419 2.0419			

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +1- 0.02 from average.

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances?	YES
13 Offic Within Campration Tolerances:	

Calibrator: Robert Raymond Date: 7/19/2012

Approved by: Mult Morry Date: 7/20/12

THERMOCOUPLE READOUT CALIBRATION DATA FORM (FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readout	Number:	urs 005]	Calibrated By:	R.Raymond
Ambient Temperature:		70	°F	Date:	12/28/2011
Omega Engineering Calibrator	Model No.	22 TC]	Serial #'s	174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference ^a Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	1	0.22
200	202	0.30
400	398	0.23
600	604	0.38
1000	1009	0.62
1200	1209	0.54

Are all the Thermocouple Readout calibration points within calibration standard of \leq to 1.5 %?

Yes

1.5 %

	(Ref. Temp., oF + 460) - (Test T	herm. Temp.,	oF + 460)	* 100 <=
	Ref. Temp., oF	+ 460		100 <
Calibrator Signature:	Robert Raymond	Date:	12/28/201	1
Approval Signature:	Michael Mowen	Date:	1/3/12	



DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs	005	CALIBRATED BY:	R. Raymond	
CALIBRATION STANDARD:		Secondary	AMBIENT TEMPERATURE (F):	69	
CALIBRATION STANDARD ID:		328963	AMBIENT PRESSURE (In Hg):	29	
DATE	CALIBRATED:	7/18/2012	Secondary Standard Correction Factor	1.018	
		GAS VOLUM	E		
Setting	Gas Volume	Gas Volume	Gas Volui	me	
(delta H)	Metered (ft3)	Corrected	DGM (ft:	3)	
	Secondary	(ft3)	Control Cor	sole	
	Standard	Vw	Vd		
0.5	5	5.090	5.350	5-6 4	
1.0	5	5.090	5,351		
2.0	10	10.180	10.717		
3.0	10	10.180	10.741		
4.0	10	10.180	10.729	ALTER AND AND	
		TEMPERATU	RE		
Calibrator			Average	Э	
Temperature			DGM		
(F)			(F)		
Tw	ŀ		Td		
70.0	į		72.0	g 17 H	
71.0			73.0		
71.0			76.0	A STATE OF THE STA	
72.0			78.0	SHELL -	
71.0			80.0		
		CALCULATIO	NS		
	Gamma	Delta			
(min)	(Y)	H@			
13.14	0.9538	1.9232			
9.15	0.9524	1.8687			
13.07	0.9540	1.8957			
10.26	0.9512	1.7524	1		
9.06	0.9552	1.8083	7		
	Avg Y	Avg Delta H@			
	0.9533	1.8497		-	
	0.9333	1.6497			
Tolerances	0.9733	2.0497			

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +/- 0.02 from average.

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for Individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances?	YES	

Calibrator: Robert Raymond Date: 7/18/2012

Approved by: Michael Monor Date: 7/20/12

Pitot Tube Calibration Data Sheet Calculation Printout

Pitot Tube	e Identifica	tion Number:	PT-9	Date:	1/16/2012	
	(Calibrated by:	T.Brado			
		7	A" Side Calibration			
	Run No.	ΔP_{std}	ΔP_s	$C_{p(s)}$	Absolute Deviation	
-	1	1.50	2.10	0.837	0.0040	
	2	1.50	2.06	0.845	0.0041	
	3	1.50	2.08	0.841	0.0000	
		Ave	erage C _{p(s)} (Side A)	0.841	0.0027	
		"[B" Side Calibration		13	
	Run No.	ΔP _{std}	ΔPs	C _{p(s)}	Absolute Deviation	
	1	1.50	2.12	0.833	0.0013	
	2	1.50	2.14	0.829	0.0026	
	3	1.50	2.12	0.833	0.0013	
		Ave	erage C _{p(s)} (Side B)	0.831	0.0017	
	Average $C_{p(s)}$ Difference 0.0093 Average $C_{p(s)}(C_{p(s)}(A)+C_{p(s)}(B))/2$ 0.836					
	Acceptance Criteria					
	Average Deviation (Side A) : Must be ≤ 0.01 PASS Average Deviation (Side B) : Must be ≤ 0.01 PASS					
		Average	C _{p(s)} Difference : M	lust be ≤ 0.01	PASS	
-	alibrator: upervisor:	JB-	In .		Date: //6/12 Date: //17/12	

Pitot Tube Calibration Data Sheet Calculation Printout

Pitot Tube Identification Number:		PT-15	Date:	1/16/2012		
Calibrated by:		T.Brado	: :			
		11	A" Side Calibration			
	Run No.	ΔP _{std}	ΔP _s	C _{p(s)}	Absolute Deviation	
	1	1.50	2.11	0.835	0.0060	
	2	1.50	2.05	0.847	0.0061	
	3	1.50	2.08	0.841	0.0000	
		Av	erage C _{p(s)} (Side A)	0.841	0.0041	
			B" Side Calibration			
	Run No.	$\Delta P_{\rm std}$	ΔPs	C _{p(s)}	Absolute Deviation	
	1	1.55	2.19	0.833	0.0032	
	2	1.60	2.20	0.844	0.0082	
	3	1.55	2.20	0.831	0.0051	
		Av	erage C _{p(s)} (Side B)	0.836	0.0055	
	Average C _{p(s)} Difference 0.0047					
	Average $C_{p(s)}(C_{p(s)}(A)+C_{p(s)}(B))/2$ 0.838					
	r		<u>Acceptance (</u>	<u> Criteria</u>		
	Average Deviation (Side A) : Must be ≤ 0.01 PASS Average Deviation (Side B) : Must be ≤ 0.01 PASS					
	 	Average	e C _{p(s)} Difference : M	ust be ≤ 0.01	PASS	
	Calibrator:	113m			Date: 1/16/12	
	Supervisor:	Tall.	dy		Date: 1/17/12	



DRY GAS METER CALIBRATION SPREADSHEET

				R. Raymond
CALIBRATIO	ON STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION	STANDARD ID:	328963	AMBIENT PRESSURE (In Hg):	29
DATI	E CALIBRATED:	8/13/2012	Secondary Standard Correction Factor	1.018
		GAS VOLUM	E	
Setting	Gas Volume	Gas Volume	Gas Volum	ne
(delta H)	Metered (ft3)	Corrected	DGM (ft3	•
	Secondary	(ft3)	Control Con	sole
	Standard	Vw	Vd	
0.5	5	5.090	5.275	
1.0	6	6.108	6.380	
2.0	10	10.180	10.658).
3.0	10	10.180	10.705	
4.0	10	10.180	10:693	-
		TEMPERATU	RE	
Calibrator			Average	
Temperature			DGM	
(F)			(F)	
Tw			Td	
71.0	1		81.0	
71.0	1		81.0	
72.0	1		84.0	
71.0	1		86.0	
72.0			86.0	
	*	CALCULATIO	NS	
	Gamma	Delta		
(min)	(Y)	H@		
13.22	0.9819	1.9215		
11.11	0.9729	1.8849		
13.09	0.9718	1.8806		
10.43	0.9704	1.7777		
9.14	0.9673	1.8270	7	
	Avg Y	Avg Delta H@		
	0.9729	1.8584		
Tolerances	0.9529 0.9929	1.6584 2.0584		

Y = Ratio of reading of wet test meter to dry test meter, tolerance for individual values +/- 0.02 from average,

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances?	YES
--	-----

Approved by:

Robert Raymond

Date: 8/13/2012

8/13/2012



DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs	005	CALIBRATED BY:	R. Raymond
CALIBRATIO	ON STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION	STANDARD ID:	328963	AMBIENT PRESSURE (In Hg):	29
DATE	CALIBRATED:	8/13/2012	Secondary Standard Correction Factor	1.018
		GAS VOLUM	E	
Setting	Gas Volume	Gas Volume	Gas Volun	ne
(delta H)	Metered (ft3)	Corrected	DGM (ft3)
	Secondary	(ft3)	Control Con	sole
	Standard	Vw	Vd	
0.5	5	5.090	5.378	
1.0	5	5.090	.5.386	
2.0	10	10.180	10.794	
3.0	10	10.180	10.767	- 10
4.0	10	10.180	10.793	ALM IN IN
		TEMPERATU	RE	
Calibrator	ľ		Average	
Temperature			DGM	
(F)			(F)	
Tw			Td	
71.0			76.0	
71.0		12	77.0	
73.0			81.0	A
73.0	ľ		83.0	
73.0	1		84.0	
		CALCULATIO	NS	
	Gamma	Delta		
(min)	(Y)	H@		
13.28	0.9542	1.9571	11	
9.12	0.9533	1.8426		
13.11	0.9524	1.9040		
10.42	0.9559	1.7975		
9.09	0.9530	1.8206		
	Avg Y	Avg Delta H@		
	0.9538	1.8644		
- 1	0.9338	1.6644		
Tolerances	0.9738	2.0644		

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +/- 0.02 from average.

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances?	YES

Calibrator: Robert Raymond Date: 8/13/2012

Approved by: Well Com



Spinning Vane Calibration Data Sheet Calculation

Pitot Tube Identification Number: Spinning Vane Date: 3/5/2012

> Calibrated by: T Gregg

Clockwise Calibration							
Run No.	Run No. Standard Pitot (ft/min)		C _{p(s)}	Absolute Deviation			
1	4973	4865	1.001	0.0090			
2	4856	4872	0.988	0.0035			
3	4923	4959	0.986	0.0055			
	Average C _{p(s)}		0.992	0.0060			

Counter Clockwise Calibration							
Run No.	Standard Pitot (ft/min)	Spinning Vane (ft/min) $C_{p(s)}$		Absolute Deviation			
1	4867	4815	0.995	0.0002			
2	4879	4849	0.993	0.0021			
3	4886	4817	0.997	0.0019			
	Average C _{p(s)}		0.995	0.0014			

Average C _{p(s)} Difference	0.0033
Average $C_{p(s)}(C_{p(s)}(CW)+C_{p(s)}(CCW))/2$	0.994

<u> Acceptance Criteria</u>

Average Deviation (CW): Must be ≤ 0.01 Average Deviation (CCW): Must be ≤ 0.01 **PASS PASS**

Average $C_{p(s)}$ Difference : Must be ≤ 0.01

Supervisor:

PASS

Calibrator:	Date:	3/5/2012
	5.	0/5/0040
Supervisor:	Date:	3/5/2012

Appendix F



TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

PROJECT NO. 39400681.00001

Battery Recycling Co., Inc.

Lot #: H2H150402

Todd Gregg

URS Corporation 1093 Commerce Park Dr Suite 100 Oak Ridge, TN 37830

TESTAMERICA LABORATORIES, INC.

Kevin S. Woodcock Project Manager

August 27, 2012

ANALYTICAL METHODS SUMMARY

H2H150402

PARAMETE	R	ANALYTICAL METHOD			
Inorgani	c Lead Emissions			CFR60A 12	
Reference	es:				
CFR60A	"Test Methods"	, 40 CFR,	Part 60,	Appendix A, July 1, 1993.	

SAMPLE SUMMARY

H2H150402

WO # 5	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MV5EH	001	AQS-2987,86,85,84 FURNACE 2 RUN 3	08/02/12	
MV5EJ	002	AQS-2983,82,81 FURNACE 1 RUN 3	08/02/12	á
MV5EK	003	AQS-2980,79,78,77 FURNACE 2 RUN 2	08/01/12	
MV5EL	004	AQS-2976,75,74,73 FURNACE 1 RUN 2	08/01/12	
MV5EM	005	AQS-2972,71,70,69 FURNACE 2 RUN 1	07/31/12	
MV5EN	006	AQS-2968,67,66 FURNACE 1 RUN 1	07/31/12	
MV5EP	007	AQS-2965,64,63 BLANK	08/02/12	
	IUS.			

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE H2H150402

The results reported herein are applicable to the samples submitted for analysis only. If you have any questions about this report, please call (865) 291-3000 to speak with the TestAmerica project manager listed on the cover page.

This report shall not be reproduced except in full, without the written approval of the laboratory.

The original chain of custody documentation is included with this report.

Sample Receipt

There were no problems with the condition of the samples received.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

These stack gas samples were prepared and analyzed using TestAmerica Knoxville standard operating procedure KNOX-MT-0016 which is based on Method 12, "Determination of Inorganic Lead Emissions from Stationary Sources". SW-846 Method 6010B as incorporated in TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter, the nitric acid probe rinse and the nitric acid impinger solution as a combined sample using HNO_3 and H_2O_2 . This digestate was adjusted to final volume and analyzed for lead by ICP.

Lead results were calculated using the following equation:

Result, $ug = (Raw Sample Concentration, \mu g/L) \times (Bench Dilution Factor) \times (Final Digestate Volume, L)$

The serial dilution of sample AQS-2980, 79, 78, 77 FURNACE 2 RUN 2 was slightly outside control limits for lead due to physical or chemical matrix interferences.

CERTIFICATION SUMMARY

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Knoxville L-A-B		DoD ELAP	· ·	L2311
TestAmerica Knoxville	Arkansas DEQ	State Program	6	88-0688
TestAmerica Knoxville	California	State Program	9	2423
TestAmerica Knoxville	Colorado	State Program	8	N/A
TestAmerica Knoxville	Connecticut	State Program	1	PH-0223
TestAmerica Knoxville	Florida	NELAC	4	E87177
TestAmerica Knoxville	Georgia	State Program	4	906
TestAmerica Knoxville	Hawaii	State Program	9	N/A
TestAmerica Knoxville	Indiana	State Program	- 5	C-TN-02
TestAmerica Knoxville	lowa	State Program	7	375
TestAmerica Knoxville	Kansas	NELAC	7	E-10349
TestAmerica Knoxville	Kentucky	State Program	4	90101
TestAmerica Knoxville	Louisiana DOHH	State Program	6	LA110001
TestAmerica Knoxville	Louisiana DEQ	NELAC	6	83979
TestAmerica Knoxville	Maryland	State Program	3	277
TestAmerica Knoxville	Michigan	State Program	5	9933
TestAmerica Knoxville	Minnesota	NELAC	5	047-999-429
TestAmerica Knoxville	Nevada	State Program	9	TN00009
TestAmerica Knoxville	New Jersey	NELAC	2	TN001
TestAmerica Knoxville	New York	NELAC	2	10781
TestAmerica Knoxville	North Carolina DENR	State Program	4	64
TestAmerica Knoxville	North Carolina DHHS	State Program	4	21705
TestAmerica Knoxville	Ohio	OVAP	5	CL0059
TestAmerica Knoxville	Oklahoma	State Program	6	9415
TestAmerica Knoxville	Pennsylvania	NELAC	3	68-00576
TestAmerica Knoxville	South Carolina	State Program	4	84001
TestAmerica Knoxville	Tennessee	State Program	4	2014
TestAmerica Knoxville	Texas	NELAC	6	T104704380-TX
TestAmerica Knoxville	Federal	USDA		P330-11-00035
TestAmerica Knoxville	Utah	NELAC	8	QUAN3
TestAmerica Knoxville	Virginia	NELAC	3	460176
TestAmerica Knoxville	Virginia	State Program	3	165
TestAmerica Knoxville	Washington	State Program	10	C593
TestAmerica Knoxville	West Virginia DEP	State Program	3	345
TestAmerica Knoxville	West Virginia DHHR	State Program	3	9955C

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

QC DATA ASSOCIATION SUMMARY

H2H150402

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH	PREP BATCH #	MS RUN#
SAMPLE#	MAIKIX	METHOD	BATCH #	BAICH #	MS RON#
001	AIR	CFR60A 12		2233100	
002	AIR	CFR60A 12		2233100	*
003	AIR	CFR60A 12		2233100	
004	AIR	CFR60A 12		2233100	
005	AIR	CFR60A 12		2233100	
006	AIR	CFR60A 12		2233100	
007	AIR	CFR60A 12		2233100	

Sample Data Summary

Client Sample ID: AQS-2987,86,85,84 FURNACE 2 RUN 3

TOTAL Metals

Lot-Sample #...: H2H150402-001

58.9

Matrix..... AIR

Date Sampled...: 08/02/12

Date Received..: 08/14/12

DARAMETER

REPORTING RESULT LIMIT

THOD PREPARATIONANALYSIS DATE

WORK ORDER #

Prep Batch #...: 2233100

Lead

1.0

ug

UNITS

CFR60A 12

08/21-08/23/12 MV5EH1AA

Dilution Factor: 1

Analysis Time..: 14:25

MDL....: 0.35

Matrix....: AIR

URS Corporation

Client Sample ID: AQS-2983,82,81 FURNACE 1 RUN 3

TOTAL Metals

Lot-Sample #...: H2H150402-002

Date Sampled...: 08/02/12 Date Received..: 08/14/12

REPORTING WORK PREPARATION-RESULT UNITS METHOD LIMIT ANALYSIS DATE ORDER #

Prep Batch #...: 2233100

39.5 1.0 ug CFR60A 12 08/21-08/23/12 MV5EJ1AA

> MDL..... 0.35 Dilution Factor: 1 Analysis Time..: 14:30

Client Sample ID: AQS-2980,79,78,77 FURNACE 2 RUN 2

TOTAL Metals

The state of the s	: H2H150402-		Received.	.: 08/14/12	Matrix:	AIR
PARAMETER	RESULT	REPORTIN LIMIT	G UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #	: 2233100				9	
Lead	92.9	1.0 .	ug	CFR60A 12	08/21-08/23/12	MV5EK1AA
		Dilution Fac	tor: 1	Analysis Time: 14:35	MDL	: 0.35

Client Sample ID: AQS-2976,75,74,73 FURNACE 1 RUN 2

TOTAL Metals

	: H2H150402-	004 Date R	eceived.	.: 08/14/12	Matrix:	AIR
PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #		3.5		amen. 10	00/07 00/02/70	1000 T T T
Lead	96.3	1.0	ug	CFR60A 12	08/21-08/23/12	WA'PRLTWW
		Dilution Facto	r: 1	Analysis Time: 15:07	MDL	1 0.35

Client Sample ID: AQS-2972,71,70,69 FURNACE 2 RUN 1

TOTAL Metals

Lot-Sample #...: H2H150402-005

Matrix....: AIR

Date Sampled...: 07/31/12

Date Received..: 08/14/12

REPORTING PREPARATION- WORK
PARAMETER RESULT LIMIT UNITS METHOD ANALYSIS DATE ORDER #

Prep Batch #...: 2233100

Lead 92.6 1.0 ug CFR60A 12 08/21-08/23/12 MV5EM1AA

Dilution Factor: 1 Analysis Time..: 15:12 MDL...... 0.35

Client Sample ID: AQS-2968,67,66 FURNACE 1 RUN 1

TOTAL Metals

Lot-Sample #: H2H150402-006 Date Sampled: 07/31/12 Date Received: 08/14/12				.: 08/14/12	Matrix:	
PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #	: 2233100	9				
Lead	83.0	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EN1AA
		Dilution Facto	or: 1	Analysis Time: 15:17	MDL	: 0.35

Client Sample ID: AQS-2965,64,63 BLANK

TOTAL Metals

Lot-Sample #...: H2H150402-007

Matrix..... AIR

Date Sampled...: 08/02/12

Date Received..: 08/14/12

REPORTING RESULT LIMIT

LIMIT UNITS

PREPARATION- WORK
ANALYSIS DATE ORDER #

Prep Batch #...: 2233100

Lead 27.3

1.0 ug

CFR60A 12

METHOD

08/21-08/23/12 MV5EP1AA

Dilution Factor: 1

Analysis Time. .: 15:22

MDL..... 0.35

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H2H150402

NOTE(S):

Matrix..... AIR

PARAMETER	RESULT	REPORTIN	G UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
MB Lot-Sample	#: H2H200000	-100 Prep B	atch #	: 2233100	*	
Lead	ND	1.0	ug	CFR60A 12	08/21-08/23/12	MV7VM1AA
		Dilution Fac	tor: 1			
		Analysis Tim	e: 13:56		(e)	

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H2H150402

Matrix..... AIR

	PERCENT	RECOVERY		RPD		PREPARATION-	PREP-
PARAMETER	RECOVERY	LIMITS	RPD	LIMITS	METHOD	ANALYSIS DATE	BATCH #
Lead	99	(80 - 120)			CFR60A 12	08/21-08/23/12	2233100
	104	(80 - 120)	4.4	(0-20)	CFR60A 12	08/21-08/23/12	2233100
		Diluti	on Fac	tor: 1	Analysis Time.	. 14:01	

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H2H150402

Matrix..... AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	8	PREPARATION- ANALYSIS DATE	PREP BATCH #
Lead	10.0	9.91	ug	99	72	CFR60A	12	08/21-08/23/12	2 2233100
	10.0	10.4	ug	104	4.4	CFR60A	12	08/21-08/23/12	2233100
		D	ilution Fa	actor: 1	7	Analysis 7	Pime: 14:01		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results,

TestAmerica Knoxville

ICP Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Thermo iCAP 6500 Duo ICP

Data File Name: F082312A.arc

Element	PDS MV5EKA	Original Sample MV5EK	Spike Added	Percent Recovery
Pb	5310.29	836.42	5000	89.5

Original Sample Result = 929.36 ug/L

Original Sample Result adjusted for PDS dilution = 929.36 ug/L x 9 mL / 10 mL = 836.42 ug/L

Spike Added = $50000 \text{ ug/L} \times 1 \text{ mL} / 10 \text{ mL} = 5000 \text{ ug/L}$

PDS Result = 5310.29 ug/L

PDS Recovery = $[(5310.29 \text{ ug/L} - 836.42 \text{ ug/L}) / 5000 \text{ ug/L}] \times 100 = 89.48\%$

TestAmerica Knoxville

ICP Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Thermo iCAP 6500 Duo ICP

Data File Name: F082312A.arc

Element	PDSD MV5EKA	Original Sample MV5EK	Spike Added	Percent Recovery
Pb	5380.76	836.42	5000	90.9

Original Sample Result = 929.36 ug/L

Original Sample Result adjusted for PDS dilution = 929.36 ug/L x 9 mL / 10 mL = 836.42 ug/L

Spike Added = $50000 \text{ ug/L} \times 1 \text{ mL} / 10 \text{ mL} = 5000 \text{ ug/L}$

PDS Result = 5380.76 ug/L

PDS Recovery = $[(5380.76 \text{ ug/L} - 836.42 \text{ ug/L}) / 5000 \text{ ug/L}] \times 100 = 90.88\%$

Sample Receipt Documentation



ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference COC No.: 8/14/2012

Page ___1___ of ____2___

ample Team: TG, MM, RR Laboratory Co	URS Sample Team:
ject Number: 39400681.00001 Laboratory Destir	Project Number:
Project Name: Battery Recycling Company Sample Shipment	Project Name

Todd Gregg

Project Manager:

August 14, 2012	Test America	Kevin woodcock	865-291-3082	N/A	
Sample Shipment Date:	aboratory Destination:	Laboratory Contact:	Project Contact/Phone:	Carrier Waybill No.:	

URS Corporation	1093 Commerce Park Drive	Suite 100	Oak Ridge, Tenn	37830	Todd Gregg	URS Corporation	865-220-8101	todd.gregg@urs.com	
Bill To:		,			Report To:				91

Sample Number	Sample Type	Date Collected	Date Collected # of Containers	Sample Matrix	Requested Testing Program	Special Instructions	
AQS-2987	Furnace # 2 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead		
AQS-2986	Furnace # 2 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead		
AQS-2985	Furnace # 2 Run # 3	08/02/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead		
AQS-2984	Furnace # 2 Run # 3	08/02/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead		
AQS-2983	Furnace # 1 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead		
AQS-2982	Furnace # 1 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead		
AQS-2981	Furnace # 1 Run # 3	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganie Lead		
TURNAROUND TIME REQUIRED	S REQUIRED	Nоппаl:	X	Rush:			

TURNAROUND TIME REQUIRED	Normal: X	Rush:		
POSSIBLE HAZARD IDENTIFICATION:			1 John Dominad	*
Nonhazard: A	Radiological:	Tea	Level 01 QC nequired: I.	•
SAMPLE DISPOSAL:	Return to Client		Disposal By Lab	Х
1. Relinquished by: Todd Gregg	regg / Date: 8/14/2012	1. Received by	Date: 8/14/2012	2012
Signature/Affiliation:	Time: 7:55	Signature/Affiliation / Mental / Mental	Time: 13	557
2. Relinquished by	Date:	2. Received by	Date:	
Signature/Affiliation:	Time:	Signature/Att/Hation:	Time:	
3. Relinquished by	Date:	3. Received by	Date:	
Signaturo/Affiliation:	Time:	Signature/Affiliation:	Time:	
Comments:				

ANALYSIS REQUEST AND

CHAIN OF CUSTODY RECORD

August 14, 2012 Test America Sample Shipment Date: Laboratory Destination:

Project Name: Battery Recycling Company Project Number: 39400681.00001

Reference COC No.

8/14/2012

of Page 2

Sample Number	Sample Type	Date Collected	Date Collected # of Containers	Sample Matrix	Requested Testing Program	Special Instructions
AQS-2980	Furnace # 2 Run # 2	08/01/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2979	Furnace # 2 Run # 2	08/01/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2978	Furnace # 2 Run # 2	08/01/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2977	Furnace # 2 Run # 2	08/01/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2976	Furnace # 1 Run # 2	08/01/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2975	Furnace # 1 Run # 2	08/01/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2974	Furnace # 1 Run # 2	08/01/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2973	Furnace # 1 Run # 2	08/01/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2972	Furnace # 2 Run # 1	07/31/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2971	Furnace # 2 Run # 1	07/31/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2970	Furnace # 2 Run # 1	07/31/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2969	Furnace # 2 Run # 1	07/31/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2968	Furnace # 1 Run # 1	07/31/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2967	Furnace # 1 Run # 1	07/31/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2966	Furnace # 1 Run # 1	07/31/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2965	Blank	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2964	Blank	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2963	Blank	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	

CHAIN OF CUSTODY RECORD ANALYSIS REQUEST AND

H24150402

Reference COC No.:

8/14/2012

of

Page 1 Kevin woodcock August 14, 2012 Test America 865-291-3082 N/A Project Contact/Phone: Sample Shipment Date: Laboratory Destination: Laboratory Contact: Carrier Waybill No.: Project Name: Battery Recycling Company voiect Number: 39400681.00001 TG, MM, RR Todd Gregg

64	17	8		. 1		. v		
URS Corporation	1093 Commerce Park Drive	Suite 100	Oak Ridge, Tenn	37830	Todd Gregg	URS Corporation	865-220-8101	todd.areaa@urs.com
Bill To:					Report To:			li i
7		, k				79.		

Project Manager.__

Project Number: URS Sample Team:

Sample Number	Sample Type	Date Collected	# of Containers	Sample Matrix	Requested Testing Program	Special Instructions
AQS-2987_	Furnace # 2 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2986,	Furnace # 2 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	HAND DELIVERED
AQS-2985~	Furnace # 2 Run # 3	08/02/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	NO CUSTORY SEALS REFEIGH AT AMMENT
AQS-29847	Furnace # 2 Run # 3	08/02/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	TEMP BKD 8-14-12
AQS-2983 ~	Furnace # 1 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2982~	Furnace#1Run#3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2981	Furnace # 1 Rith # 3	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	
TURNAROUND TIME REQUIRED	REQUIRED	Normal:	×	Rush:		
POSSIBLE HAZARD IDENTIFICATION: Nonhazard: Kighly Toxic:	DENTIFICATION: X		Flammable; Radiological:		Level of QC Required: L	n.
SAMPLE DISPOSAL:		H	Return to Client		Disposal By Lab	y X q
I. Relinquished by:	Todd Gregg	Date:	8/14/2012 3 tS3	1. Received by	Jour Person	Date: 8/14/2012
2. Relinquished by		Date:		2. Received by		1
Signature/Alutation: 3. Relinquished by		Date:		3. Received by		Date:
Signature/Affiliation:		Time:		Signature/Affiliation:		Time;
Comments:					£	

HAHISOYOX

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

. Sample Shipment Date:
L'aboratory Destination:

Test America

Project Name: Battery Recycling Company Project Number: 39400681,00001

August 14, 2012

Reference COC No.:

8/14/2012

Page 2 of 2

Date Collected # of Containers Sample Matrix 08/01/12 1 of 1 filter
PNR
Impinger Catcli
Impinger Catch
filter
PNR
Ітріпдег Catci
impinger Catch
filter
PNR
Impinger Catch
Impinger Catch
filter
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Impinger Catcl
filter
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Impinger Catcl
0
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TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST Lot Number: Hallismills

QA026R23.doc, 022812 Comments/Actions Taken HA, HAWN DELIVERS □ 5b Samples not received-on COC ☐ 5a Samples received-not on COC \square 2c Cooling initiated for recently □ 9a Could not be determined due If no, was pH adjusted to pH 7 - 9 If No, what was the problem? collected samples, ice present. □ 15a Incomplete information □ 15a Incomplete information □ 15a Incomplete information □ 15a Incomplete information ☐ 1b Incomplete information ☐ 7a Headspace (VOA only) □ 3a Sample preservative = □ 10a Holding time expired □ Incomplete information □ 1a Do not match COC □ 8a Improper container ☐ 14a Not relinquished ☐ 1c Marking smeared □ 1f COC not received to matrix interference □ 2b Cooler Temp = □ 2a Temp Blank = with sulfuric acid? Z4a Not present □ 1d Label torn □ 4b Not intact Date:8-14-12 □ 13a Leaking □ 1e No label □ 6a Leaking □ 6b Broken □ 13b Other: □ 19a Other □ 1g Other: □ 4c Other: NA. ž MALES ! (MALES Š 11. For rad samples, was sample activity info. provided? Were all of the samples listed on the COC received? Is the cooler temperature within limits? (> freezing Were custody seals present/intact on cooler and/or Were all of the sample containers received intact? Were samples received in appropriate containers? Did you check for residual chlorine, if necessary? Were VOA samples received without headspace? PM Instructions: Was COC relinquished? (Signed/Dated/Timed) Were samples received with correct chemical 10. Were samples received within holding time? Are tests/parameters listed for each sample? 17. Is the date/time of sample collection noted? 18. Is the client and project name/# identified? Do sample container labels match COC? 19. Was the sampler identified on the COC? temp. of water to 6°C, VOST: 10°C) 2. For 1613B water samples is pH<9? 13. Are the shipping containers intact? Is the matrix of the samples noted? preservative (excluding Encore)? Sample Receiving Associate: 0618 (IDs, Dates, Times) containers? Review Items Quote #: